Nomadic Architecture: Refuge on Ontario Crown Land

by

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ABSTRACT

The history of Crown Land and its evolution from Magna Carta to the Canadian Charter of Rights and Freedoms illuminates the handling of boundaries and mishandling of people. For cultures that practiced oral traditions, the paper-based treaties raise questions of validity and coercion.[1] The original inhabitants did not own the land, but instead fostered a deep relationship with it.[2] In a similar way today, someone could live on much of the same land without ownership of it.

Crown Land is managed by the Ministry of Natural Resources and Forestry, and it occupies 87% of Ontario, equating to 39 million hectares. Two of its ten Land Use Designations - General Use and Enhanced Management Areas - have unique potentials because of their rules for overnight accommodation. Inhabitants may camp for free on a given site but must move 100 meters every 21 days to remain on Crown Land.[3] Theoretically, one could live permanently in these circumstances as long as they comply, and a mobile building could satisfy this scenario.

The motivation to do so is stimulated by the COVID-19 pandemic that normalized working and schooling from home for many Canadians. 'Zoom cities' are remote places where real estate has been consumed for people to isolate themselves. Often waterfront properties and for a wealthier class, this has provided a new outlook on where and how people live and work. In addition, housing prices have inflated dramatically over recent decades, further precluding the possibility of owning property for young adults. For many, the pandemic was the turning point for people to leave Toronto for affordable real estate and access to green space. This thesis bridges these seemingly separate occurrences, illustrating an alternative means of living where owning property is renounced, yet one maintains economic viability. Tethered, but remote.

The architecture necessary to achieve this must be nomadic and leave no traces of its existence. This approach to a practice that is synonymous with permanence reflects the historical narrative as much as the necessity for lightness in the future. Lightness in this context operates at several scales: in weight; in possession and ownership; and ecological impact. The building and its user would exist symbiotically with their site, embracing a closed-system approach that accounts for all of their energy, food, and waste. It is driven by its context, shaped by topography, local light, and tectonic potentials. This thesis offers a practical and technical approach yet is also speculative in nature, looking to new technologies and reflecting on its social context.

This nomadic lifestyle questions our society's unsatisfiable quench for material accumulation. The ability to deny this indulgence in order to better understand what we need as beings may bring us to be happier individuals, content with an existence that unfolds at a slower pace.

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LIST OF FIGURES

PART ONE

DEMARCATING GROUND

THE THICK OF THINGS

a historical overview

Crown Land is a complex product of its creators and their way of approaching the land they lived on. It has a quite direct lineage with very obvious goals at first, becoming less obvious with each subsequent milestone. Tracing Crown Land back to its first seeds uproots an entangled thicket of justifications based on one another. The first root begins at a surprising place; with a desperate king willing to meet his baron's demands to prolong his life, if only just a year. Where it ends is hard to say: it is still growing.

1215 Magna Carta

The instigation of Crown Land was quite literally at knife point, at a time when citizens knew the scale of who held them captive and could seize them by force. Carta gave citizens new liberties, including the due process of justice, right of travel, settled various land ownership scenarios, and positioned the English Church in the court of law.[4] It signified the first shift from monarchy to democracy in the history of the English Crown, and its framework underwrote every forthcoming colonial document by the Crown.[5]

1217 Charter of the Forest

Forest law threatened the right to subsistence. For barons and commoners this land was precious: hunting grounds, firewood, plants, honey, and pasturage.[6] The Charter replaced and elaborated on sections of Magna Carta that covered access to forests. It also permitted animals to graze, deer to be hunted, trees to be cut, free-men to inhabit and own woods (and its honey), and allowed trespassing.[7]

1497 Giovanni Caboto

John Cabot was the first English representative to arrive in Canada. No records of individual crew members, nor were first hand accounts of the voyage were ever recorded; and this was precisely what England would base its claim to North America on.[8]

1666 Abolishing Feudalism

This political and economic system gave nobility and land in exchange for labour and military service or serfs and vassals. [9] England and France had already established themselves in North America, so this socioeconomic shift was ripely timed. The colonies could now be established with a mercantile system (capitalism), implemented precisely before the Fur Trade and key to its success.

1670 Royal Charter

This gave an exclusive trading monopoly over the entire Hudson Bay drainage basin to the Hudson's Bay Company.[10] They traded throughout Rupert's Land, and their success was highly dependent on First Nations' expertise and relations. The land - named after the King's Belgian cousin - was almost four million square kilometers or 40% of modern Canada. (*fig. 1.01*)

1701 Act of Settlement

The act ensured the succession of the English Crown and implemented certain constitutional changes.[11] The settlement of this lineage was crucial to securing their future colonial endeavors.

1759 Battle of Quebec

The turning point of the Seven Years War that ultimately ended as Britain being the sole colonial power in North America.[12] This event was catalytic to future pronouncements.

1763 Royal Proclamation

The Proclamation claimed ownership of the continent, as well as stated that Aboriginal land would remain so unless negotiated by treaty.[13] This was the first time that land was specifically reserved for "Indians" by the Crown. The lands could only be sold to the British monarch and not to an individual: the question of land and life became property of the monarch and

their heirs.[14] Following this moment, all lands were considered Crown Lands.[15] Terminology such as "on the land" suggested a differentiation between above and below the soil.

1791 Constitutional Act

The Constitutional Act of 1791 divided Canada into Upper and Lower, respectively. At the request of the settler-citizens, it also created legislative and executive governments in Canada - though, these were both answerable to Britain.[16]

1867 British North America Act

Confederation politically joined Upper and Lower Canada with Nova Scotia and New Brunswick to form the Dominion of Canada. It was done without input from any First Nations or Métis people. This was the first step in the abolition of the HBC's monopoly in Canada. With it, the continental strategy of encirclement by the Crown was complete, along with their rhetorical, paper-based power.[17] (*fig. 1.01*)

1870 Deed of Surrender

Britain loaned the Dominion of Canada $300,000 (close to $19 million now) to buy out the HBC, who also received land and a guarantee to continue trading without taxes.[18] On 15 July 1870, Rupert's Land and the Northwest Territories belonged to Canada, entangled in its English web.

1871 Dominion Lands Act

This act encouraged the settlement of the west using the new CPR railway.[19] The Dominion Land Survey is the largest survey grid in the world, spanning 80 million hectares and 1.25 million homesteads.[20] After 1885 the government stripped the Métis of their land titles using 'scripts' which gave them a plot of land in return for assimilation. This was usually done dishonestly through forgery or coercion, leaving many Métis homeless as a result.[21]

1982 The Constitution Act

This signaled a shift in power from legislative to judicial branches of government. It also incorporated the British North America Act and the Canadian Charter of Rights and Freedoms - along with the inseparable soul of Magna Carta.

2011 Far North Act

The most recent Act concerning Crown Land created a boundary north of Woodland Caribou and Wabakimi Provincial Parks to protect 225,000 square kilometers of boreal forest (21% of the province). It is not supported by the Nishnawbe Aski Nation as the permafrost prevents their participation in modern economics.[22] (*fig. 1.01*)

From this history one can begin to distill the motivations of the Crown with their capture of North America. Spurred on by the Age of Discovery, conquering became competition, and so Canada became one of many happenstance assets to the Crown. They did not fully understand the monetary worth of the land when Cabot first arrived, but France's interest incited their own. It was about far more than money, but a grand vision of resources and expansion. The process of their privatization of the globe was fundamentally instanced by *enclosure* and the act of closing off. The Crown's enclosure process occurred both physically (fences, barriers, ditches) and through legislation (Acts and treaties). The exaggeration of 'wild uninhabited land' created a perception of resource versus rejection; asset from Aboriginal. The land was never vast and untouched, rather, people had always lived there, only differently.[23]

The management of citizens was also a benefit of enclosure. With the decline of feudalism in the 17th century, people acquired individual rights with the ascent of economic entrepreneurialism. Owning property became an economic and legal mechanism where the state could govern its citizens. It bound the individual to a place, reducing social deviance and ensuring subjects to use their (minimal) possession as an economic asset. The desire to secure ownership of something is motivated by its potential to generate profit.[24] For common folk, that motivation did not exist until it sprung upon them like a trap. This capitalist drive is one which the thesis inherently questions, as well as the Canadian mythology used as an illusion to disguise the Crown's inner workings.

From the start, Crown Land in England was presented back to their citizens as a gift, but rather it was hard-fought. Similarily, Canada's Crown Land is also marketed as *public land*, which is widely accepted to mean open and accessible to all Canadians.[25] However, this perception is inaccurate; but a small window into a much larger picture. The reality is that the land was stolen from its original inhabitants, divided by resources, and justified using written laws that held no weight in the Indigenous people's oral culture. These same laws became the predecessor for every law to follow afterwards, meaning the entire nation was founded on illegitimate and unstable ground. Why are these laws upheld if it is widely accepted that they were wrongly done? How can we ultimately justify constitutions and treaties on a document such as the Royal Proclamation if that itself was founded unjustifiably? In the end, the party who used the most force won, against groups of people who wanted to establish resource trading. Survival of the fittest, they suppose.

fig. 1.01 Crown Land Evolution

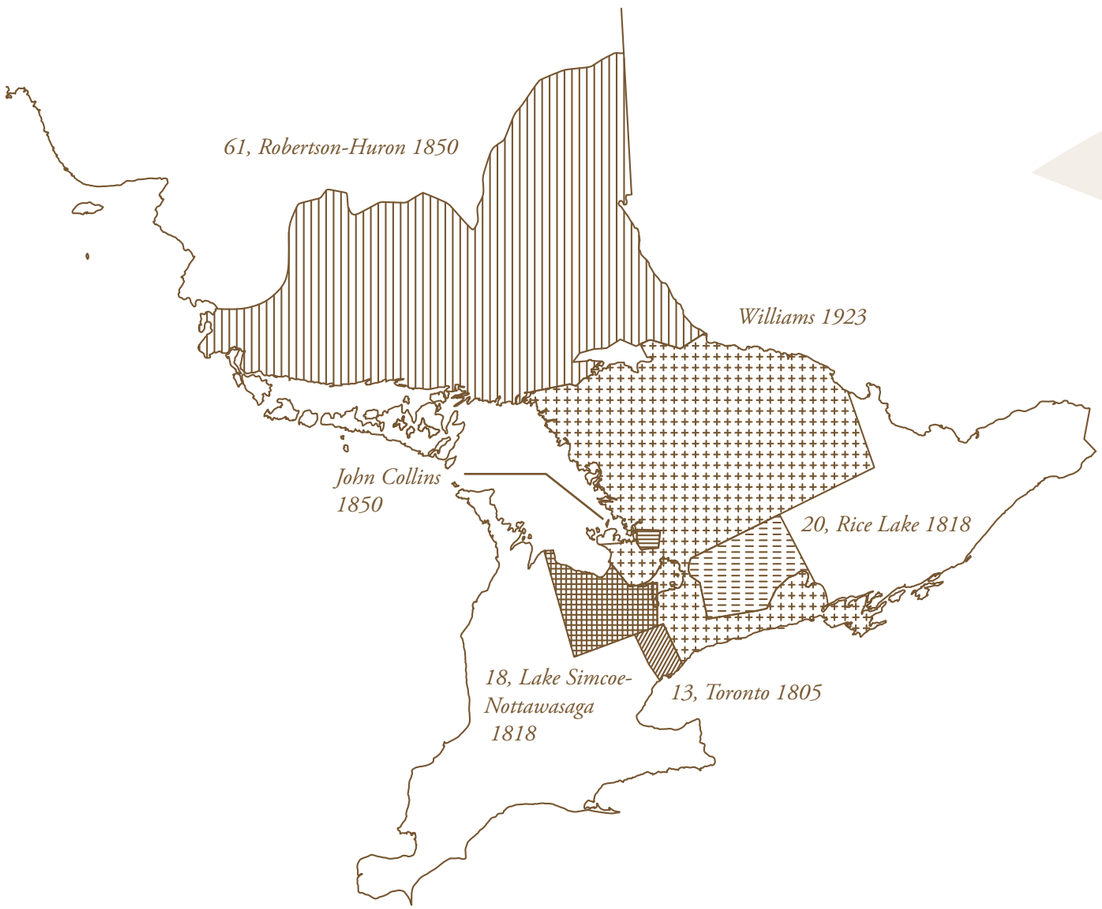

fig. 1.02 Regional Treaties

fig. 1.03 Territories, by author

NESTING DOLLS

modern management

The Department of Crown Lands was formed in the 1820s as the predecessor of the Ministry of Natural Resources and Forestry (MNRF). The 1837 Public Lands Act created a legislative framework to sell Crown Land, and the BNAA made Crown Lands a provincial responsibility. The MNRF have two founding principles: that all Canadians have a right to Crown Land; and that the MNRF alone can manage it.[26] From the 1940s to the 1990s land was sold for private recreation or residential use, but today this can only happen through municipal intervention. Most of the regulations for Crown Land can be found within the Public Lands Act of 1990 (PLA), with sections such as the following:[27]

> 13(2) no person shall erect any building or structure on restricted areas
> 49. public right of passage
> - any person may exercise a public right of passage on a road other than a private forest road
> 69.2 no damage to Crown Land or property

Section 21.1 specifically regulates *occupational authority*, which is who and how one can occupy the land. There are applications for specialized uses of Crown Land that are associated with a time period. These come in the form of Land Use Permits, Licenses of Occupation, Leases and Easements, and Freehold Letter Patents.[28] They are placed in order from the least ecological impact to the most, and shortest amount of allocated time (up to 10 years) to most (ownership).

However, it is within the O. Reg 161/17: Occupation of Public Lands Under Section 21.1 of the Act that this thesis is most concerned with, which contains rules for occupation that expand on the section within the PLA:[29]

> 5. camping units: private use
> 1. strictly for noncommercial purposes
> 2. the person does not occupy the public lands, or any other public lands within 100 meters thereof, for more than 21 days in a calendar year.
> 11. ice fishing huts
> 1. located on ice
> 2. solely for fishing or overnight accommodation

The Mining Act of 1990 solidifies the distinction between what is above and below ground, first mentioned in the Royal Proclamation in 1763. When someone purchases a plot of land, oftentimes the right to what is below the soil still belongs to the Crown unless specified within the ownership. As another

layer to their enclosure strategy, it reinforces that only a very small percentage of the actual land can be occupied by Canadian citizens. The ownership that people often spend their lifetime acquiring is more of a rental; just a title that ensures you have to maintain the growth of the land as an asset while you are capable of doing so.

> 1. interpretation
>
> "mining rights," the right to minerals on, in or under any land;
>
> "surface rights," every right in land other than the mining rights;
>
> "surface rights owner," means, in respect of an area of land, an owner in fee simple of the land, as shown in the appropriate land registry office, who does not own the mining rights for the land;
>
> 27. where licensee may prospect for minerals
>
> a) Crown Lands, surveyed or unsurveyed
>
> 89. disposal of surface rights
>
> (1) the Minister shall reserve all surface rights and other rights excluded by or withdrawn under this Act or that have otherwise been alienated by the Crown.[30]

Within Crown Land there are ten divisions, called Land Use Designations. Each designation has specified activities or functions that can operate within, and the majority are not for public recreational usage. Only several promote public access and General Use Areas (GUA's) the most-so (*fig. 1.06*). GUA's make up the largest portion of Crown Land, and the aforementioned rules for occupation within Section 21.1 of the Act pertain within. This kind of designation also allows:

> campfires; hiking; biking; boating; canoeing; cross-country skiing; water skiing; swimming; bird watching; horse-back riding; hunting and fishing (with valid licensing); snowmobiling and all-terrain vehicles (if the area permits).

Activities such as creating a new trail, building a water crossing, or holding an organized event may require permission. An occupant must pick up and pack out litter, avoid sensitive habitats, and let alone wildlife protected under provincial law. Harvesting firewood and building wood may also be done with fuelwood and building products licenses, respectively.[31]

Enhanced Management Areas are similar designations that try to provide a more detailed land use direction in context to an area's features or values (*fig. 1.06*). Within are five categories: Natural Heritage, Recreation, Remote Access, Fish and Wildlife, and Great Lakes Coastal Areas. Each has their own specific regulations, with the first solely regarding commercial and industrial activities and the latter two preserving geographical areas.[32] However, Recreation and Remote Access operate similarly to General Use Areas, aiming to promote public use.

Conservation Reserves and Provincial Parks are governed together via the 2006 act of the same name, and its intent is to protect ecosystems and encourage ecologically sustainable activities for visitors. Hunting is not permitted in provincial parks, but is permitted in conservation reserves unless regulated otherwise. You cannot harvest timber, generate electricity, prospect, extract soil, or perform any industrial uses. Lastly, camping in provincial parks is allowed where designated with a permit, but is generally not allowed in conservation areas.[33]

The other land use designations include: First Nations Reserves, Recommended Conservation Reserves and Provincial Parks, Forest Reserves, Far North Protected Area, Provincial Wildlife Areas, and Wilderness Areas (*fig. 1.05* and *fig. 1.07*). These are smaller and do not permit recreational uses such as those allowed within GUA's (except First Nations Reserves). Besides the designated land uses by the MNRF, private property makes up the remainder of the province. Also called 'real property' in law, it appears on Crown Land maps and is subject to trespassing. This is land owned either by an individual or a corporation for private purposes, only dictated by local zoning by-laws (if any).

Within the laws identified for camping on Crown Land the definition for a "camping unit" means a structure or vehicle that may be used for camping purposes or as an outdoor accommodation and includes a tent, trailer, and the like, and any watercraft equipped for overnight accommodation.[34] The rules for occupation and the associated movement incites the question:

could someone live on Crown Land?

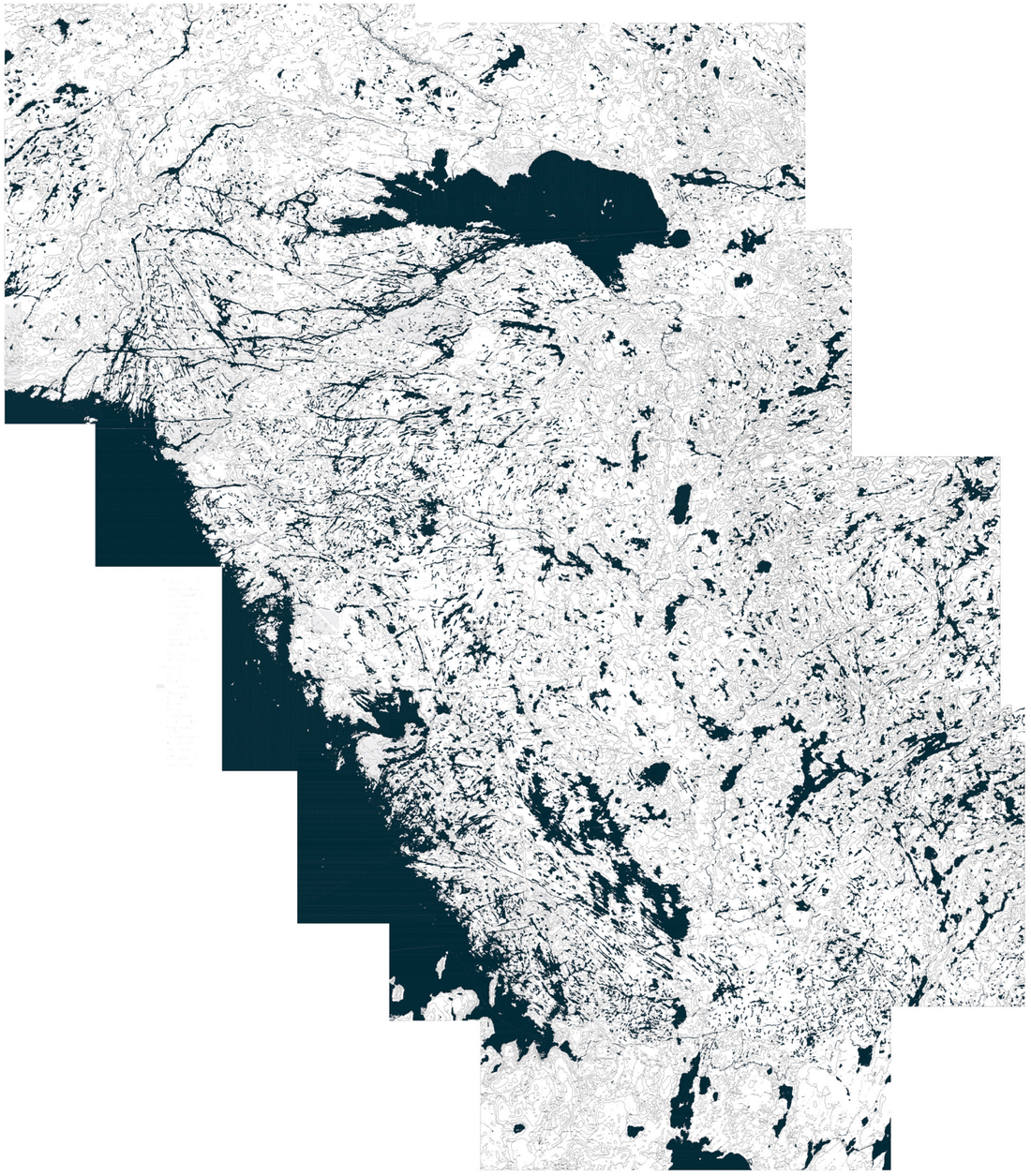

fig. 1.04 Water + Topography

fig. 1.05 First Nations Reserves + Private Property

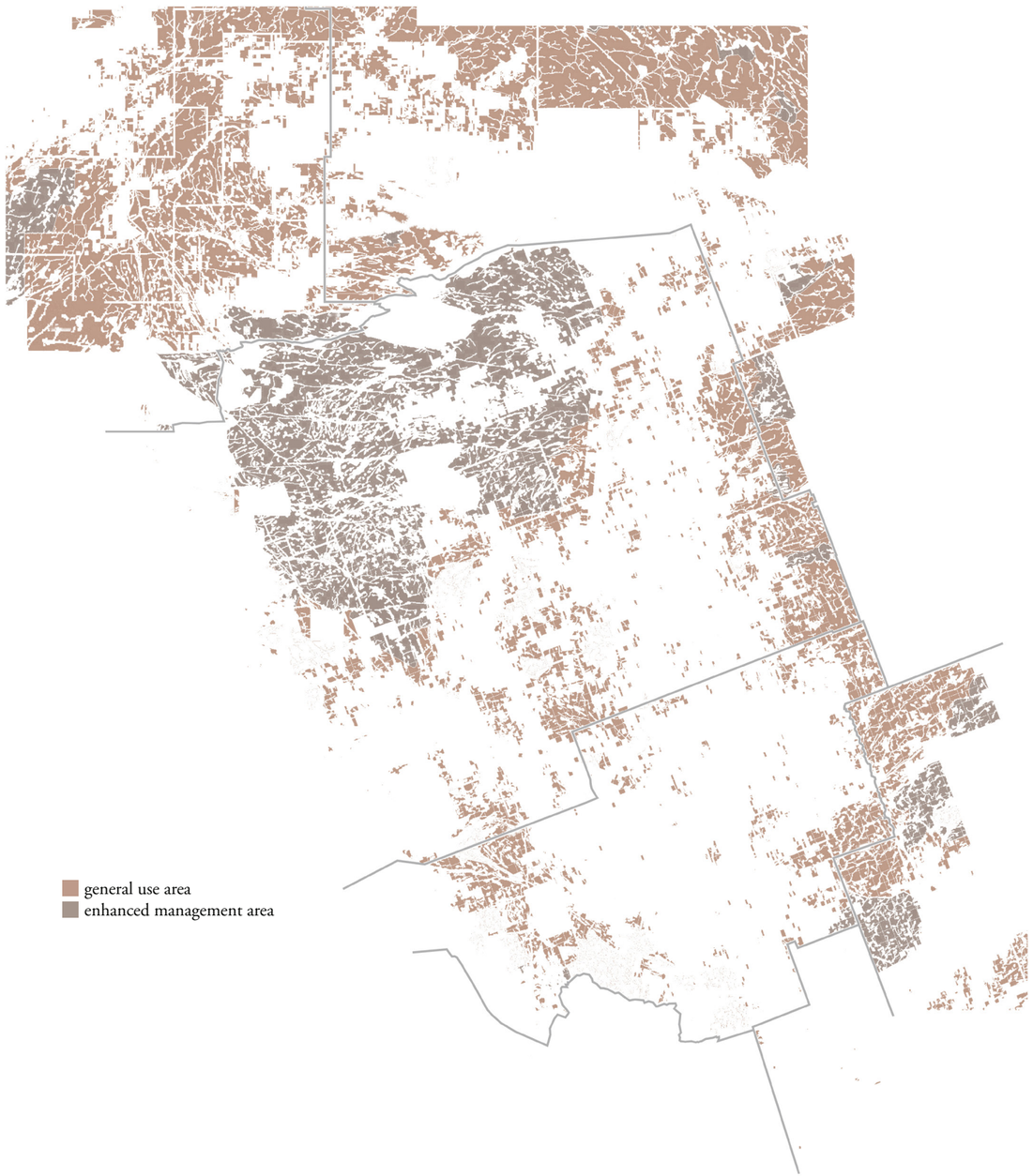

fig. 1.06 General Use Area + Enhanced Management Area

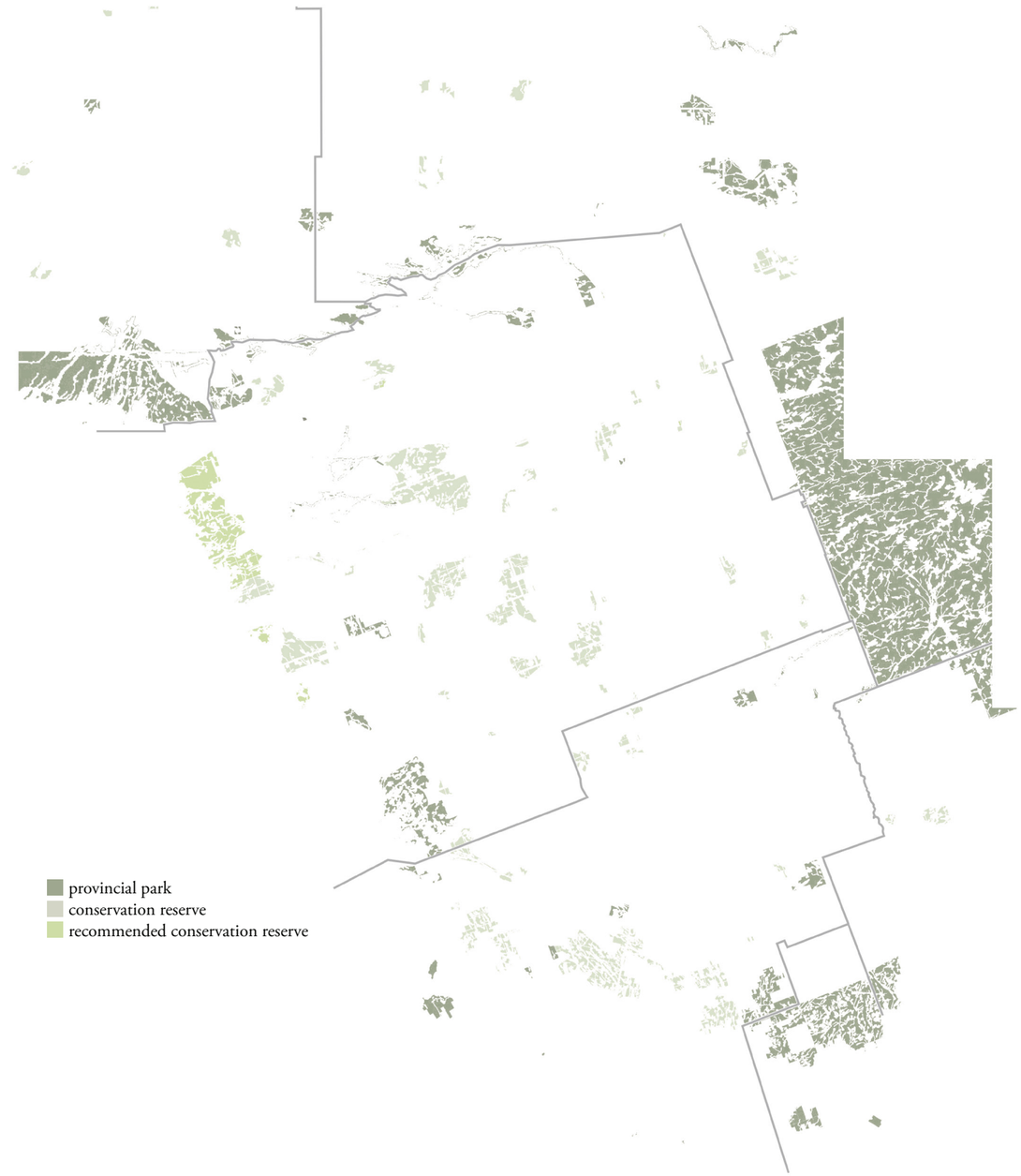

fig. 1.07 Other Management Areas

NOTES - PART ONE

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PART TWO

STATE OF AFFAIRS

ON GOINGS AND OUTGOINGS

social processes

The world saw immense change in the year 2020, and that like no other. These changes are not just temporary ones made to defer the effects of the COVID-19 pandemic, but quite permanent for some people. The virus was not the first of its kind to face mankind, and many preceding were even more devastating. However, it was the first opportunity for humans to react on a global scale, utilizing our alleged interconnectedness via intercommunications to caution one another, share information, and respond with action. Much of the behavior asked of humankind was to act with discipline and understand their place in the virality system, ranked by one's susceptibility to falling ill. For most, this involved *isolating*, or staying at home to avoid contact with others unless absolutely necessary. The isolation outlasted most people's expectations, leading to changes in their lives in order to embrace their new way of living.

For many, work and school were shifted online to a remote platform reliant on the internet. This allowed for institutions and companies to continue operations almost without added cost; most people already had access to satisfactory internet and computers. Close to one-quarter of Canadian businesses expect that 10% or more of their workforce will continue to work remotely post-pandemic.[1] In addition to this, approximately 40% of Canadians are working jobs that can be done from home.[2] This is a substantial number of people, and there is an analytical correlation between them. Most of these people have received post-secondary education: less than 30% of jobs with only a high school diploma were eligible to work from home, versus 66% for those with a bachelor's degree or higher education.[3] Therefore, a particular demographic of people was affected by the pandemic in this way: one that is highly educated and of a younger generation.

Being forced to remain at home created conflicts for many people. Small condominiums, apartments and houses are conventional in cities, but especially in Toronto, Ontario. People needed to live where they worked pre-pandemic, and with the congestion of built fabric in Toronto, the only way to live there was to compromise with a small residence. These are rented or leased properties, almost never purchased. Any larger dwelling is simply unaffordable - especially for the outlined younger generation - with the average price of a house in Toronto at $1.03 million in August of 2020.[4] A combination of the small, overcrowded residences and the cost to live in one was the tipping point for many during the pandemic.

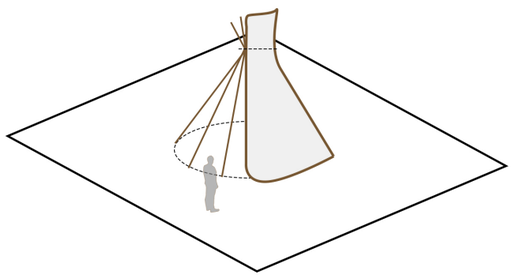
People began to express their desire to leave Toronto and live somewhere they could afford and have access to green space. Remote places where real estate was suddenly consumed for people to isolate themselves during the pandemic gained the term "Zoom towns." There was a notable increase in property sales since March of 2020, with places like Peterborough and Lindsay up 56%.[5]

Muskoka saw an increase in 73% comparing June 2019 to 2020, exemplifying the desire to own waterfront property where one is both connected and disconnected to the city.[6] There are many communities north of Toronto that are a part of "cottage country," a phrase used in Ontario to describe areas where seasonal lakefront homes are common. However, these are reserved for a wealthier class that can afford to have both a weekday and weekend home. The dream of property ownership in Toronto or cottage country is only diminishing with time for younger generations.

These existent scenarios speak to a particular individual. Not just one person but an entire generation of people: *millennials*. These are people born in the last twenty years of the 20th century, now in their 20's and 30's. They were urged into the education system in order to find jobs once they finished school, and are highly educated and specialized workers. With or without debt from school, they are battling a housing market tailored to a generation before them. For the sake of this thesis argument, they work for a corporation, technology start-up, design firm, or perhaps government position in Toronto, and in-person delivery was essential until the virus changed their workplace. They converted their closet into an office, and have remained working from home since. However, they are at their breaking point. Their mental health has faced difficulties with the constraints placed by the virus that will not lift soon enough. This is a very real scenario faced by many people of this generation. However, there is an alternative.

What if someone could live focused on their wellbeing, be connected to nature, whilst maintaining their occupation? By taking each of the social processes accelerated by the pandemic and combining them with the occupational legislation for Crown Land, the possibility for an alternative way of living comes into view. One has the possibility to redefine what it means to live a good life by detaching themselves from the social ethos of property.[7] Theoretically, someone could live solely on Crown Land through a *mobile architecture*; one that adapts to its environment and is nomadic in nature. This is a kind of lifestyle that fundamentally questions society's unsatisfiable quench for material accumulation. It requires one to live lightly, in many senses. The choice to deny the indulgence that has become so normalized in a consumer-oriented world is an active position. It is a stance that obligates a commitment to better understand what is necessary as human beings, and it may bring people to be happier individuals that are content with life at a slower pace.

To agree to this life is to refuse the moral blackmail that life must revolve around our expectations for greater wealth through ownership.[8] Instead, by not owning the land itself, you would allocate funds originally dedicated to mortgages or rent to other things, namely owning a quality dwelling. Living a life of minimized possession would also mean that less money is necessary to sustain said life. Therefore, one would not have to work as many hours, allocating time to other things that are important to the individual. Of course, some of that time will be spent doing things that come with this laborious lifestyle. Living off of the electrical 'grid' comes with a significant amount of upkeep and work. However, the positives greatly outweigh the negatives, and even the negatives can be seen as beneficial and essential life skills or knowledge that few people possess. How to build a fire, gather and cook one's own food, repair buildings and its systems; these are all problems that most people are sheltered from because of the modern formula of living. Humans in first-world countries are far removed from basic activities that their ancestors spent their lives understanding. Of course, this distance allowed societies to investigate other realms and prosper, but facing these realities today grounds and connects us back to the temporal nature of our lives.



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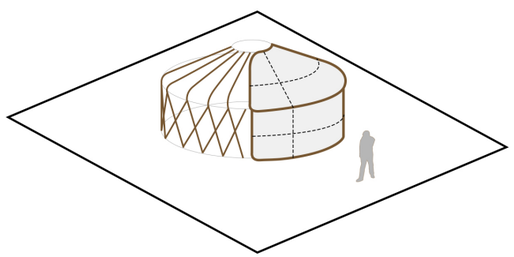

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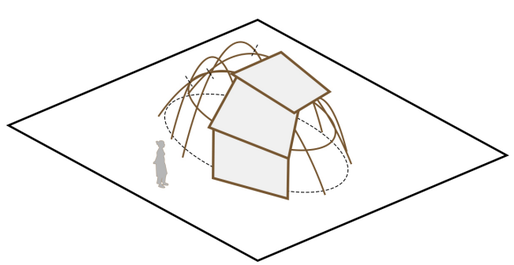


wigwam

UNDERPINNING

nomadic emergence

fig. 2.01 (opposite) Various forms of mobile architecture that are indigenous to places with similar climatic conditions. There are obvious strategies of layering using air gaps in between, as well as exploiting the strength of bent timber through curvature.

Humans were originally a nomadic species, spending the large majority of their 100,000 year existence as hunter-gatherers, capable of adapting to annual patterns and conditions.[9] Formal architecture dates to only 10,000 years ago, signified by permanent communities and year-round inhabitation.[10] These buildings were temporary, not heavy like the architecture of later generations that yearned for permanence. Their ability to move was essential to human survival through each Ice Age.[11] To this day, the Evenki hunters of Siberia remain stationary throughout the winter months and at other times migrate to hunt game.[12] They use cone-shaped pole tents (called *dju)* constructed of local timber from the taiga forests that are easily accessible.[13] Their neighbours, the Komi, are reindeer herders, often moving 1,000km over the course of a year.[14] Their tents (called *čum*) are larger than that of the Evenki, and because of the seasonal scarcity of material, some of the tent poles must be carried to their summer pastures.[15] To do this they use sleds constructed of timber, in which each and every object inside of the tent has a particular place on.[16] Even though some of the objects now include DVD players and radios, the Komi remain attentive to what is essential to their lives. The floor plan of the tent is equally significant, with dedicated positions for sleeping and storage along the perimeter, and a central lane laid with planks for walking and gathering.[17]

In the high steppes of Asia there has been less alteration to the traditional nomadic lifestyles throughout the centuries. The Mongolian *ger*, also known as the Turkic *yurt*, provides excellent protection from the cold, snow, and wind because of its shape.[18] Constructed only of small sections of timber, the kerege is a lattice grate of 50-60 poles which gain strength when loaded.[19] In North America, the *wigwam* utilizes long pliable poles that are inserted into the ground and bent into arches.[20] A second layer of arches are bent perpendicular to the first, creating an elliptical dome-like dwelling that utilizes the inherent capabilities of the locally available material.[21] The woven bark cladding is assembled by the women, sewn as panels onto the poles and then lined on the interior with mats.[22]

Today's mobile architecture makes up 25% of all dwellings in North America - home for 12,500,000 people - and is by far the largest sector of affordable housing.[23] It takes the form of RV's, camper-trailers and tiny houses, parked on lots connected to services, remaining stationary instead of fulfilling its conceived potentials. They are towable by or mounted onto a vehicle, which is necessary due to the weight of modern amenities as well as the fragility of their tectonic joints. Ken Isaacs' *How to Build Your Own Living Structures*, written in 1974, critiques the lack of enthusiasm of mobile shelters and instead opting for a do-it-yourself approach. The book acts as a construction manual for the reader, outlining the kit-of-parts to achieve "freedom now" rather than waiting until

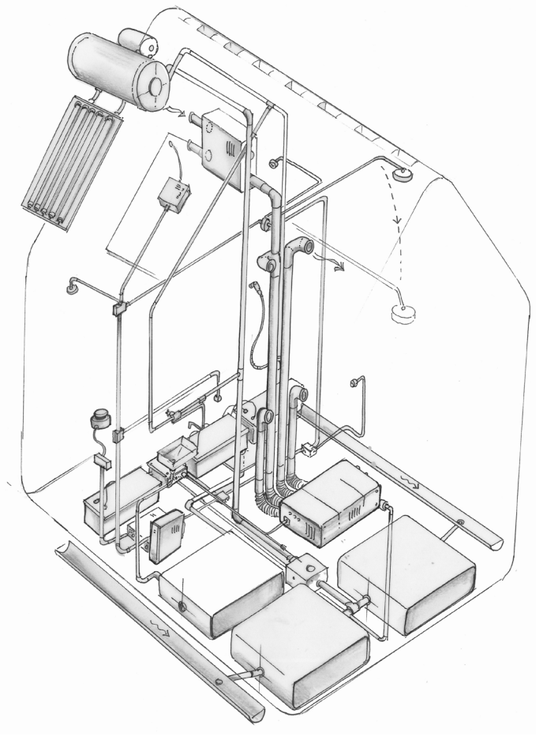
you can afford it.[24] His 8' Microhouse design was constructed of a lightweight plywood shell and raised in segments (*fig. 2.02*). It embodies the inclination for movement that is also associated with freedom, and especially creative freedom: experimentation is the rejection of tradition, the refusal to remain static.

fig. 2.02 (opposite top) Ken Isaacs' 8' Microhouse exemplifies the DIY and independent principles that mobile architecture provides its users.
fig. 2.03 (opposite bottom) This hand drawing by Renzo Piano of Diogene expresses the complexity of embedded systems that are resultant of designing for a very specific inhabitation.

theoretical grounds

The term *speculative architecture* refers to the 1960's civil rights movements and political uprisings that spurred the radical architecture of the decade. The architects reflected on their sociopolitical circumstances using an architecture that encouraged mobility as well as physical and psychological freedom.[25] *Archigram* emerged as a popular group from England who were inspired by postwar technological advancements to forward their architecture.[26] Their designs challenged the assumption that architecture was a static art: they were unconvinced that solidity was a precondition, as Western architectural tradition had mandated.[27] For example, 'Walking City' was a proposal that lacked detail, but was envisioned as a mobile zoomorphic structure that would absorb resources as it scoured the Earth.[28] "With Archigram, architecture's mobile "outsiders" - awnings, tents, caravans - had Modernist company."[29] Simultaneously, Italy was politically and economically fractured since WWII which gave rise to *Superstudio*. These architects critiqued the nationwide oppression using the 'Continuous Movement,' a proposed equal plane for humanity to access every landscape and constantly migrate.[30] These critiques of freedom and access to resources precede that of this thesis, which charters it's own course using a more pragmatic approach.

The critical work of Reyner Banham paralleled and even complimented that of the speculative architects, especially Archigram, reflecting on the uses and potentials of emerging technologies within their societal conditions. Banham's 1965 'A Home is Not a House' illustrates his unique angle, assessing the inefficiencies of housing in America. He argues that America should have shaken its European habits of permanence with its open-fronted society, using social and personal mobility to create a new approach to living.[31] The American mobile home is chaotic both visually and mechanically, as well as in its relationship to infrastructure.[32] Its potential value lies in cleanliness, the lightweight shell, its indifference to monumental architectural values, and a passion for the outdoors.[33] Banham's vision disconnects the mobile home from town electrical and sanitary supplies whilst keeping the luxuries of appliances,



all without the burden of a permanent dwelling.[34] This frames the dialogue for which this thesis falls within: one surrounding the cultural mindset (Canadian culture is/was heavily influenced by American history and pop culture) regarding how to live. Banham alludes to the possibility of an alternative means of living that reflects the true nature of a given place. Mobile architecture has the potential to embody the critical reflection presented by this thesis that opposes the colonial mentality woven in the nation's history, as well as the failed archetype of the American mobile home that was founded on the misguided concept of the 'frontier' (that the land was to be conquered and tamed).

closed worlds

The architectural design presented in this thesis is ultimately grounded in reality, choosing to be mobile for the purpose of changing sites every three weeks. This unconventional approach to a practice that is often synonymous with permanence reflects the historical narrative as much as the necessity for lightness in the future. Lightness operates at several scales: in weight for practicality; in the sense of possession and ownership; as well as in ecological impact. For these reasons, the architecture will be constructed of timber, acknowledging its temporal nature and the life cycles associated with buildings. The building and the occupant will live symbiotically with their site, embracing a *closed-system* approach. This kind of architecture is inseparable from the 20th century moon race and was even seen in many speculative architectural works. It accounts for all levels of energy, food, and waste, going beyond 'cradle to cradle' to understand the complexities of environmental science as well as the realities of resource regeneration.[35] Although simple in principle, it is technically complex and refined to ensure the building leaves no footprint as it moves along its path. The closest example to this kind of building at a compact scale is 'Diogene' by Renzo Piano (*fig. 2.03*). It begins to describe the technical precision necessary to fit all of the modern systems in a small footprint, and how to make it spatially pleasant as well. This thesis aims to combine the thinking of the speculative architects with closed-system architecture, looking to cutting-edge technologies to inform the design. This would situate the project as a near-future proposal that is very much achievable, relying on the technologies to make it possible.

regional resiliency

This kind of architecture is inseparable from its local conditions. According to Kenneth Frampton, an architecture of resistance is one that withstands globalization by incorporating indirectly-derived elements from the characteristics of a place.[36] The governing inspirations of *local architecture* may be the range and quality of local light, the topography of the site, or a tectonic derived from a certain structural mode.[37] Allowing these elements to inform and drive a design ensures it can adequately survive in these conditions, especially one as hostile as a remote wilderness. The presence and correct utilization of these elements creates a 'place-conscious poetic:' the interaction between culture and nature.[38] The tectonic ranks highest amongst these elements as it has the potential to manifest material, craftwork and gravity, transcending the technical and contributing to a greater dialogue.[39] The tectonic moment that enables this thesis project to become mobile, as well as the structure of the building itself, can embody these principles and reflect the uniqueness of place. In addition, the building will have to respond to regional lighting in order to maximize gain from solar panels, which play an important role in off-grid closed-systems. The particulars of the site are therefore crucial to the project. There can be no single model of this architecture that would function across Ontario's Crown Land because of the diverse range of ground conditions, forests, and ecosystems. This line of thought instigated a detailed site exploration to better understand the optimal potential location.

NOTES - PART TWO

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PART THREE

WHO GOES THERE?

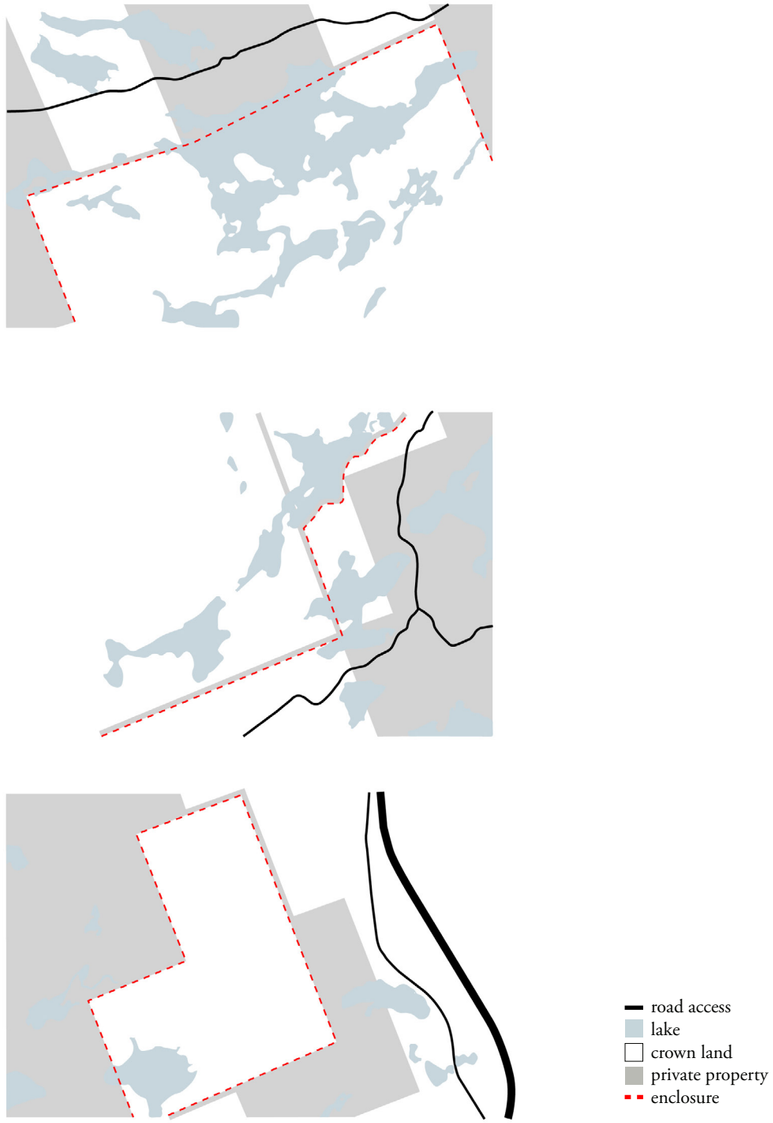


fig. 3.01 Enclosure - the act of strategic, subtle containment of land by the Crown in order to capture resources, seen above as using slivers of private property to surround land designated as "public." This conceals the reality on large-scale maps and numerical statistics: much of the land is not accessible.

TRESPASSING

choosing site

There are many potential sites for the project, and arguably any General Use (GU) or 'Recreational' and 'Remote Access' Enhanced Management Areas (EMA) have potential for some form of the project to function. In fact, the further from a city or urban center, the less attention is drawn to a segment of Crown Land, and likely the better the site in terms of quality. However, in order to optimize the site for the circumstances presented by this thesis, there are specific factors considered including internet coverage, the drive time to Toronto, property value by municipality, and forest density by Ecodistricts. These categories were used as high-level data to eliminate the less applicable zones as identified by a series of mapping. The maps were overlapped and trimmed using the extents of GU's and EMA's. Eight zones were revealed by selecting the darkest opacity, which meant they had the most overlapping areas and thereby the best sites (*fig. 3.02*).

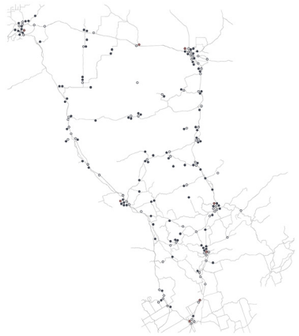
Site Zone	Land Use Designation	Internet Coverage	Drive Time to Toronto	Property Value	Forest Density	Total Points
		/4	/3	/2	/1	/10
1	GU	4	3	1.5	1	9.5
2	GU	4	3	1	1	9
3	GU	4	2.5	1.5	0.5	8.5
4	GU	3	2.5	2	0.5	8
5	GU	3	2.5	1.5	0.5	7.5
6	GU	3	2	1.5	0.5	6.5
7	GU	4	2	1	1	8
8	EMU	2	1	2	1	6

tab. 3.01 Metrics One

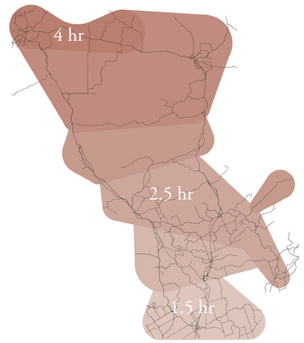
Each of these layers were assigned points on a tiered metrics system, ranking potential sites out of ten (*tab. 3.01*). For example, average property value is worth two points because although being adjacent to more expensive property strengthens the proposal, it is not as essential as having internet coverage or being reasonably close to Toronto. Being able to drive to Toronto speaks to the user: a millennial who still works a job that was based in the city and occasionally needs to drive there for a meeting. Considering they work from their remote home on Crown Land, being connected to the internet is essential. For the modern person, the internet means access to a bank, shopping, work, school, even remote doctors, and is thereby the requisite element to the success of the project.

The top three zones were selected to move onto a second round of metrics that were site-specific (*tab. 3.02*). These included nearby amenities, quality and topography of the terrain, as well as accessibility and quality of

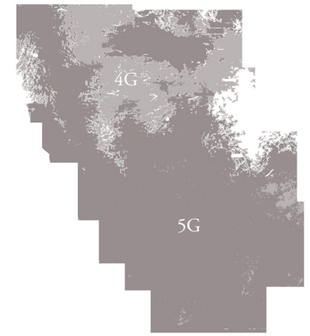
snowmobile trails



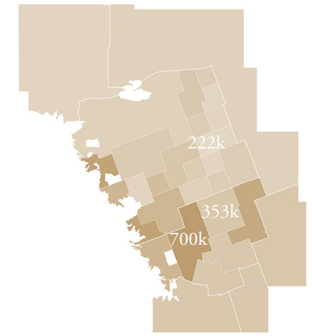
amenities



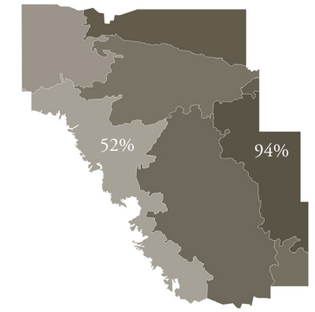
drive to Toronto



internet coverage

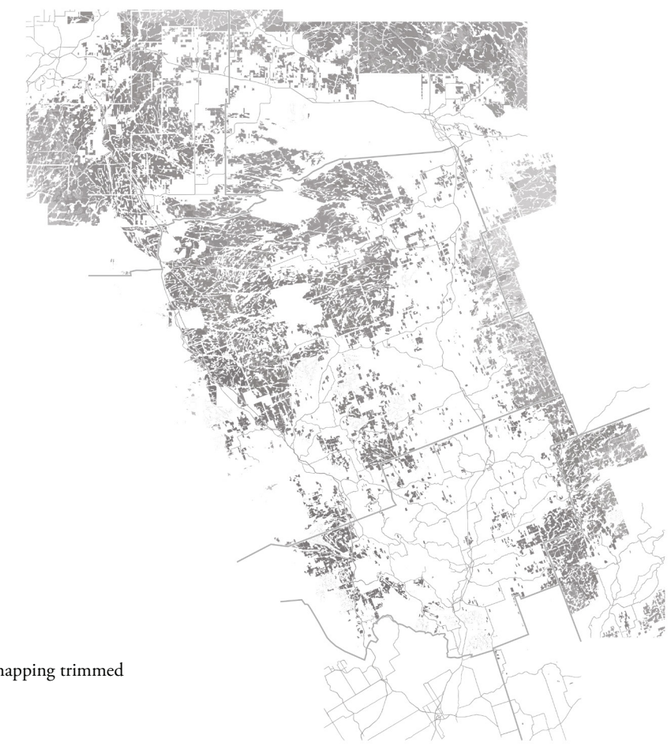


property values



forest density

mapping overlapped



mapping trimmed

fig. 3.02 Mapping Process

water. From afar, there seems to be an abundance of Crown Land in the areas under examination. However, this is deceiving; much of the land is cleverly enclosed by slivers of private property, essentially privatizing lakes and Crown Land by blocking access to them (*fig. 3.01*). These are likely government-owned parcels of property used strategically to hold onto resources that they can claim are still public because of their land designation classification.

fig. 3.03 (opposite) The remaining land with the darkest fill had the most potential to sustain the project, and these are the Potential Zones of that mapping analysis.

Two sites emerged as a draw, with one more accessible and the other of higher quality. Liebeck and Flaxman Lake are neighbouring water bodies east of Parry Sound that sit along the Seguin Trail, beginning at exit 214 on Highway 69. The largest vehicle that can access the trail is a UTV, so one would have to leave their vehicle somewhere with access to the trail. Flaxman is an 80' deep lake, ensuring year-round fresh water supply as well as sport fishing, but has two cottages on its south-most shore. The other site is located several kilometers north on Highway 518, a few minutes drive from Parry Sound. Carruthers and McLean are shallower lakes with some marsh areas, but possess enough acreage for the user to comply with the land occupation laws. There are also neighbouring cottages, meaning that although the user has less flexibility, the resources are of enough quality to sustain this lifestyle.

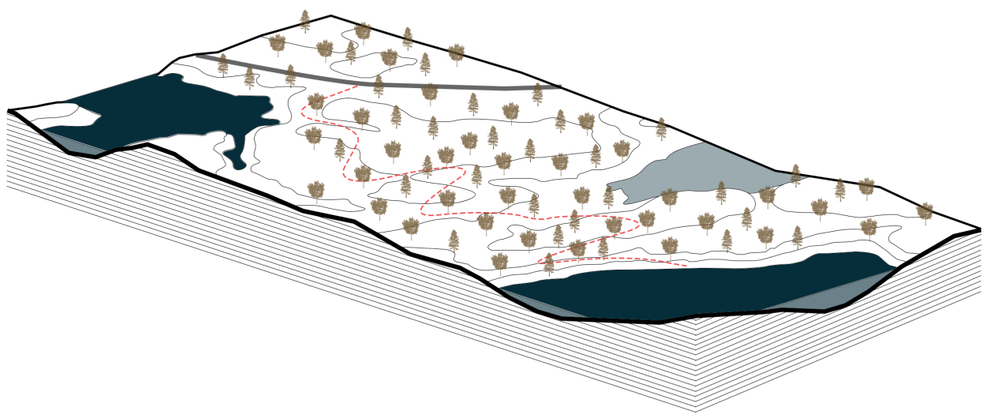
Site Name	Percentage Amenities	Direct Water Access	Direct Road Access	Ability to Move 100 m	Level Topography	Quality Terrain	Quality Lake	Total Points
	/2	/2	/2	/1	/1	/1	/1	/10
Zone 1: Lalonde Lake	0	1.5	2	0.5	0.5	0.5	0.5	5.5
Zone 2: Davies Lake	0.5	1.5	2	0.5	1	0.5	0.5	6.5
Zone 3A: Fogal Lake	1.5	1.5	2	0.5	1	1	0.5	8
Zone 3B: Liebeck + Flaxman Lake	2	2	1	1	0.5	1	1	8.5
Zone 3C: Carruthers + McLean Lake	2	2	2	0.5	0.5	1	0.5	8.5

tab. 3.02 Metrics Two

Choosing between the two sites relies heavily on the narrative and the direction the project aims to move in. Considering one must change sites every twenty-one days, this implies eighteen sites will be necessary to span a calendar year. Each singular camping unit must move to ensure sites are available to others as well as reduce environmental impacts.[1] Creating a rotation of sites would still allow for others to access them, while creating an opportunity to plan and justify the annual path. This can be in relation to adjacency to water, topography, and climate, which can all have benefits at certain times of year more than others. The quality of lakes as well as the amount of occupiable land within 3B far outweighs that of 3C, and so it becomes clear that Zone 3B is the optimal site for this thesis (*fig. 3.04*).

fig. 3.04 (below) Site 3B of Flaxman and Liebeck Lake has a range of sloping topography and lake depths.
fig. 3.05 (opposite) The Site Map displays locations to park one's vehicle, as well as a range of drive times to reach Parry Sound depending on the route.

The physical mobility of the architecture was the next point of resolution. Traditionally, buildings do not move. When people are camping they utilize collapsible tents that employ polyurethane-based lightweight fabrics. These plastics lack the durability necessary for this project to function for a sustained period of time, and do not meet the environmentally-conscious material standards the project seeks to uphold. This being said, even just the baseline-necessary number of systems to live permanently in these conditions would bear a significant amount of weight. The inconvenience of disassembling and reassembling an entire building every three weeks would be simply unreasonable, especially in northern climates where -30° C weather with snow is common. This analysis is based on both experience and speculation, but the best way to understand the potentials of a place is to visit and document it.



ENCROACHING

given conditions

fig. 3.06 (opposite above) Photography from the site.
fig. 3.07 (opposite below) Liebeck Lake when one first emerges from the forest and walks onto the ice.

The sequential approach to the site was conducted as planned, parking the vehicle on Tambasco Road east of the site and walking westward on the trail amidst a frigid January morning. Mostly an old-growth hardwood forest, oak, maple and beech trees dominated the impenetrable woods, accompanied by white cedar and various pine and spruce softwoods. The path was wide enough to allow for roughly four side-by-side snowmobiles to pass - about five meters of manicured snow. Snowmobilers were frequently passing by, cementing that although the user would be secluded, emergency help was never far away.

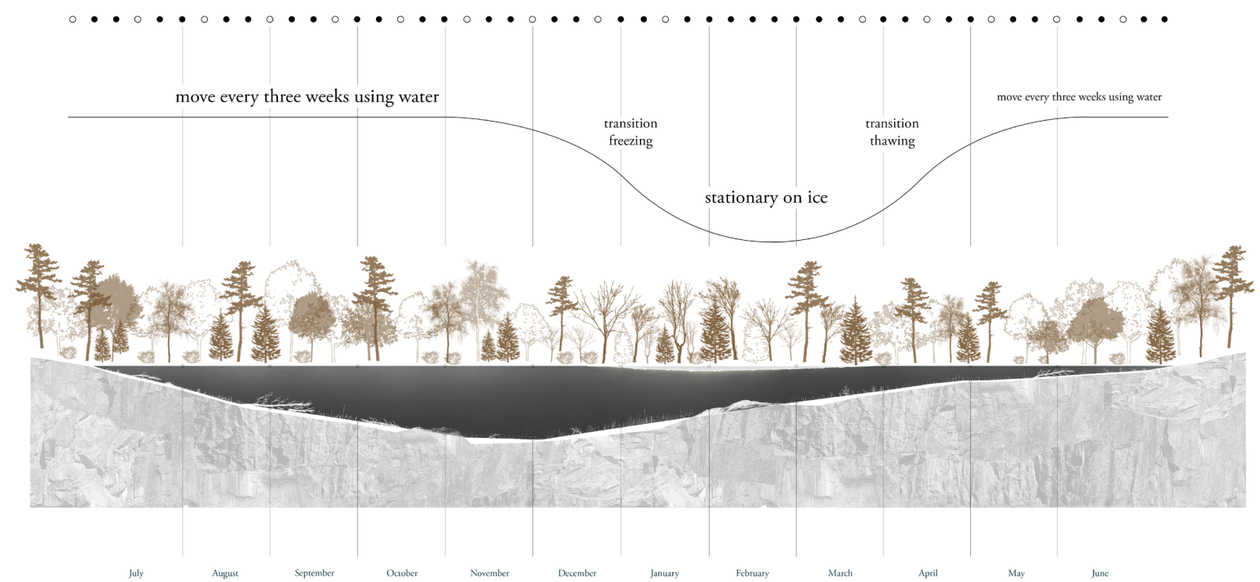
Liebeck Lake meets the trail along its edge, and this was the best entry point to approach the water. Many sections of the forest that appeared to be accessible in maps were not so in person, even in the winter when the trees bore no leaves. Here, snowshoes were necessary to break trail and head onto the ice where two feet of snow was observed. A frequent snowmobile trail crossed the lake eastward and connected it to Flaxman, which is the path necessary to gain access to that part of the site. From visiting the site and understanding the density of the forest, it became known that the project needed to utilize water as a means to float the building to become mobile. The history of mobile buildings often debate a means to move around on land, but the site conditions directly determined this decision. Had another site been selected with different physical conditions, the project would have progressed in a completely different direction. Liebeck Lake has a shoreline of ~3.5 km and Flaxman of ~4.8 km, meaning there is significant potential for the building to move the required distance throughout the year, even in tandem with multiple users that cross paths. According to the Crown laws, water is a neutral plane: it is not necessary that camping units on water or ice must move according to the twenty-one-day rule so long as the building is utilized for ice fishing.[2] In this part of Ontario, water is frozen for two to three months each year, which allows for the user to remain stationary in the winter and decrease the overall number of site changes from eighteen to fifteen.

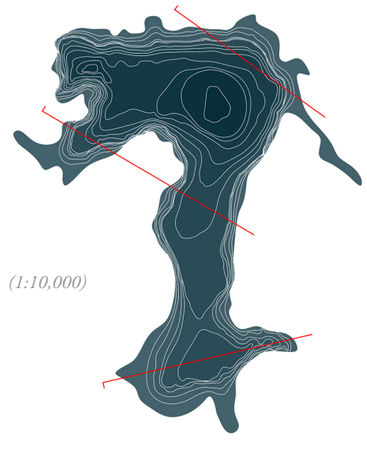
Given the annual conditions of the site, one can distill what the yearly pattern of movement would be for the user (*fig. 3.08*). Crown Land laws specifically govern by the calendar year, so after each new year the cycle restarts. The user must be particularly attune to the freezing and thawing periods as they must time their movement in order to safely mount and dismount from atop the frozen lake.

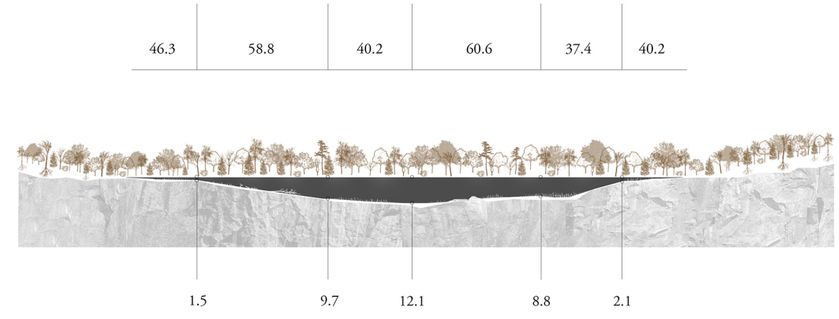
fig. 3.08 (opposite) The annual timeline indicates which weeks during the year one must move, as well as alludes to the layers of soil and rock that form the land.

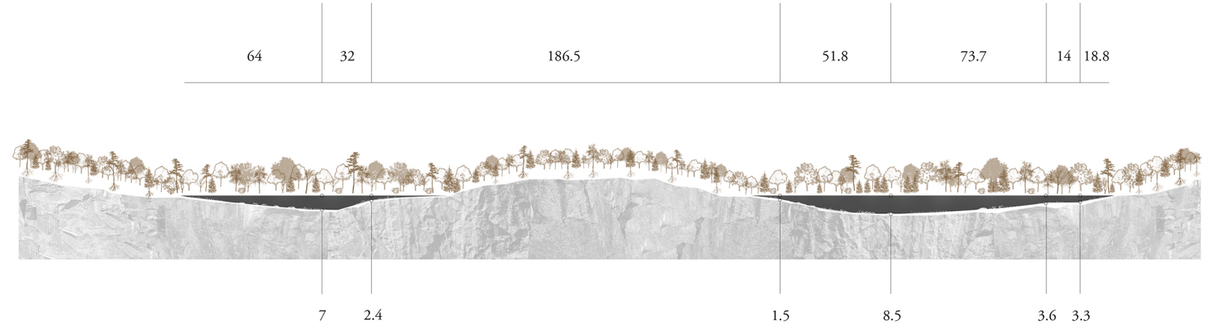
In order to properly understand the optimal locations on each lake for the project to inhabit - as well as how the building could physically respond to the site - incremental section drawings were taken across the lakes in the hopes of revealing something beyond the surface. Below ground are remnants of Lake Algonquin and the Laurentide Ice Sheet that gouged the thousands of lakes in central Ontario, depositing moraine material on the site.[3] Liebeck Lake reaches a depth of 15 meters in its north half, while Flaxman hits a considerable 24 meters; home to cold-water lake trout which indicate a healthy lake. It was revealed that Liebeck has a very gradual bank along most of its perimeter, frequently requiring upwards of 40 meters to reach a depth of 1.2 meters. Flaxman is similar along parts of its shoreline, but where the lake narrows it becomes inhabitable due to the steep slopes, where it would even be difficult to dock a boat. The southern portion of Liebeck Lake is also very shallow, but its lake-bottom resembles a swamp more than the rest of the lake, and was therefore ruled out of being suitable for occupation as well.

The findings from the site visit and site sections dictate how one must live along the lakes, and where the building can itself move. Although both lakes can support inhabitation, Flaxman Lake is used to exemplify the methodology proceeding. As depicted in *fig. 3.11,* the red zones describe uninhabitable areas of each lake, and the red dashes indicate private property that surrounds the Crown Land. With this and the topographic conditions in mind, black circles that mark the potential sites are laid out, spaced 100 meters apart. Two routes are illustrated along Flaxman, with a secluded path along the north shore as well as a path along the southern half of the lake where one must cross the open water during the summer. These sites have accessible shorelines but require a degree of understanding and sensitivity when docking the building so as not to damage the shoreline.









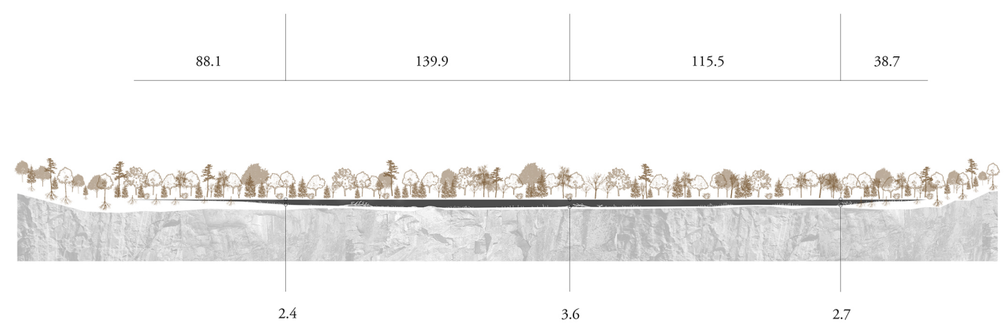
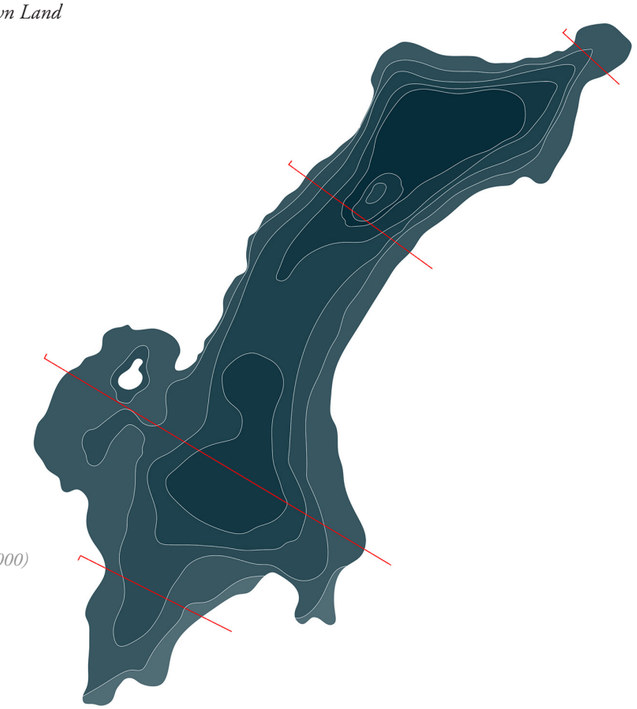


fig. 3.09 Liebeck Lake Sections *(1:3000, meters)*



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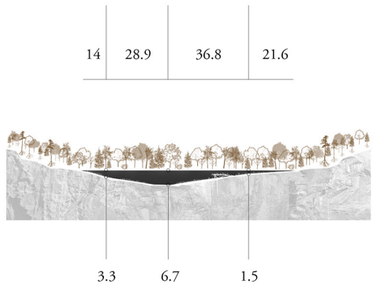
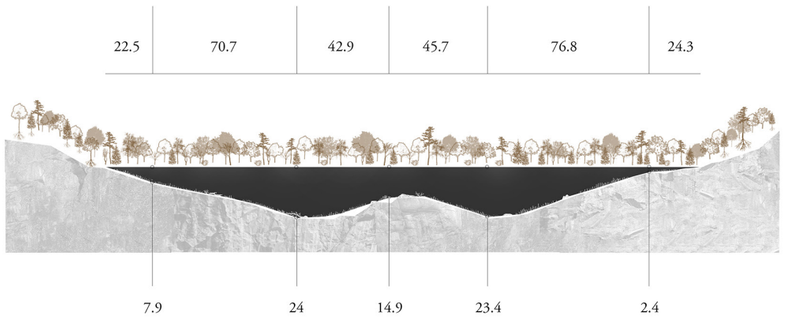
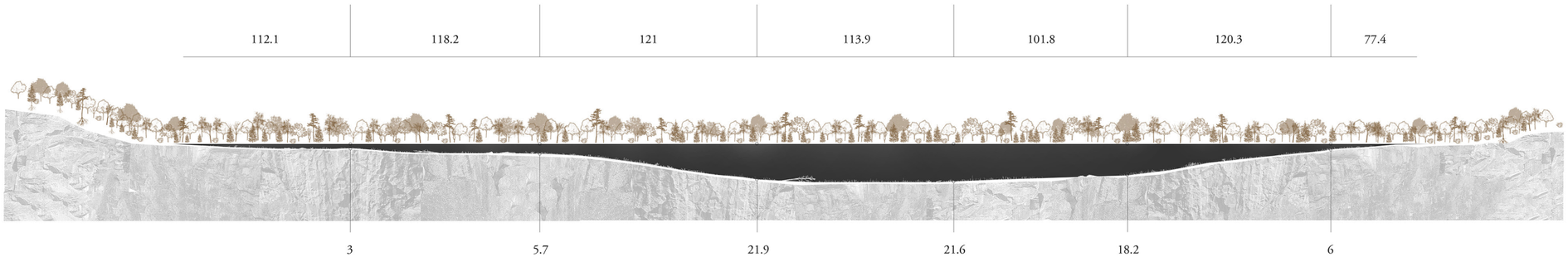






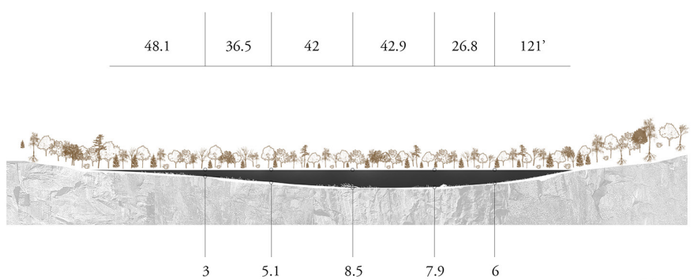


fig. 3.10 Flaxman Lake Sections *(1:3000, meters)*

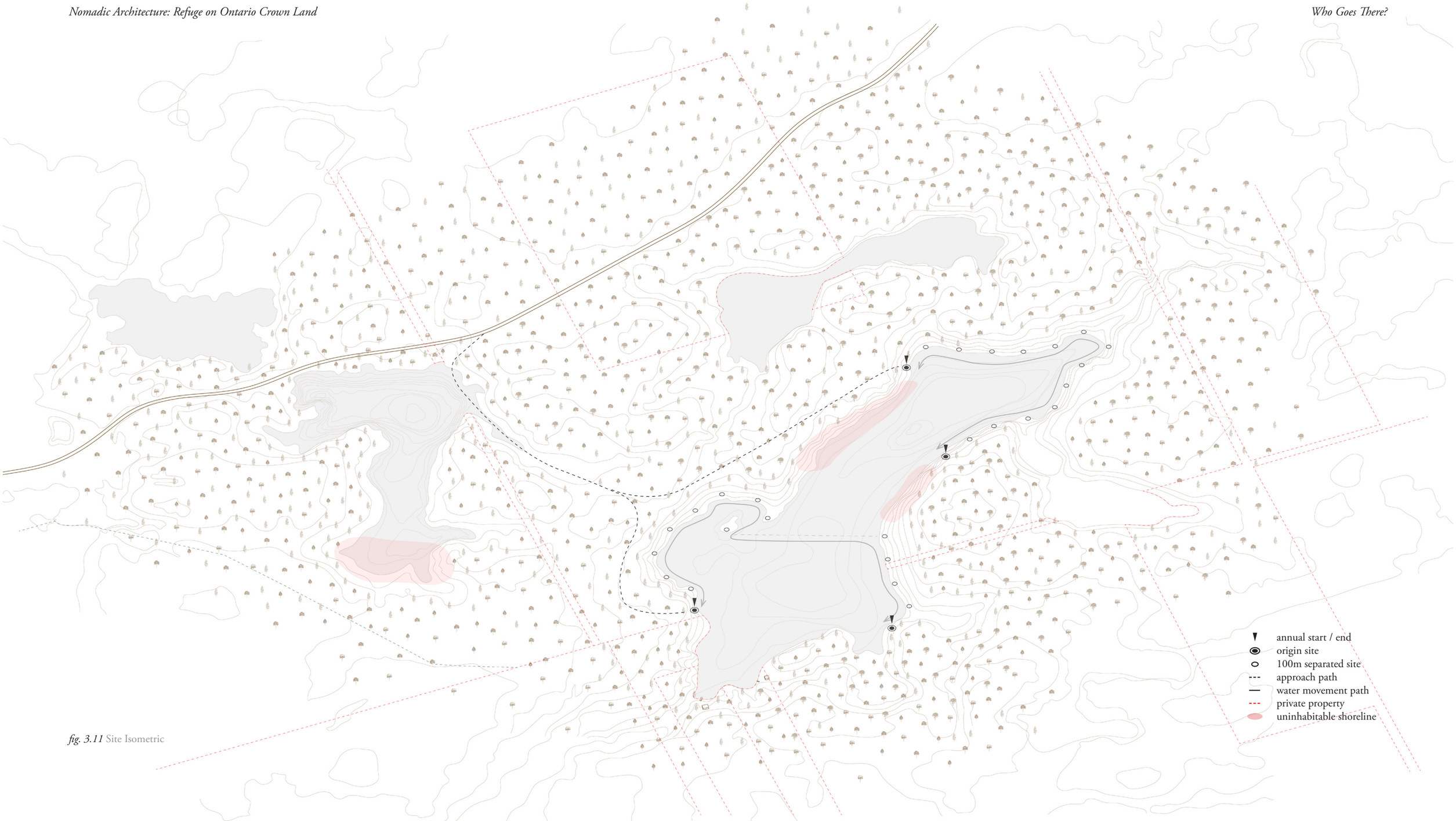


fig. 3.11 Site Isometric

NOTES - PART THREE

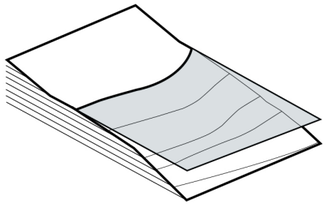
1 "Recreational activities on Crown Land," Ontario, Queen's Printer for Ontario, published July 17, 2014, updated July 2, 2020. https://www.ontario.ca/page/recreational-activities-on-crown-land

2 "Occupation of Public Lands Under Section 21.1 of the Act," Public Lands Act, R.S.O. 1990, c. P.43. https://www.ontario.ca/laws/regulation/170161

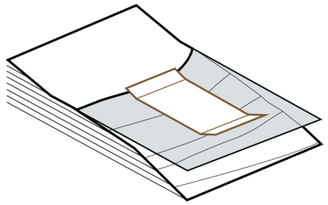
3 M.C Wester, B.L Henson, W.J. Crins, P.W.C Uhlig, and P.A Gray, "The Ecosystems of Ontario, Part 2: Ecodistricts," Ontario Ministry of Natural Resources and Forestry, Queen's Printer for Ontario, p 265.

PART FOUR

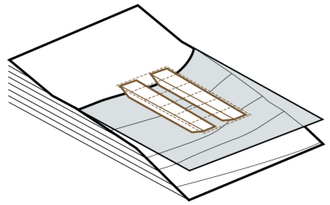
CORROBORATION



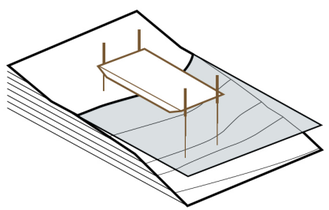
existing shoreline



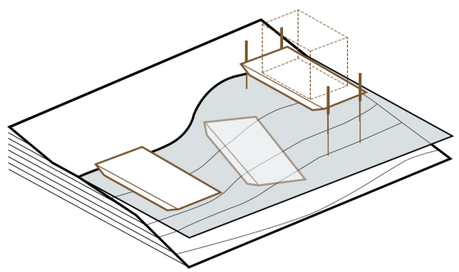
versatile platform



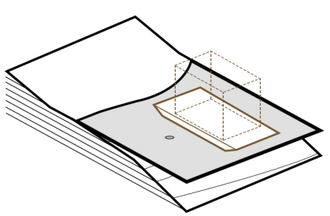
extrude + divide



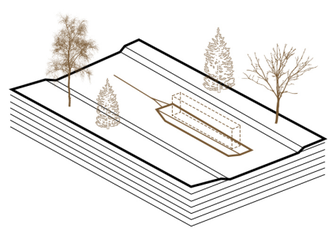
retractable foundation



water mobility



stationary winter



assembly carriage

AGGREGATION

platform design

fig. 4.01 (opposite) The platform concept evolved to take on multiple functions and embodies certain principles in doing so.

Each tier of research has progressively narrowed towards informing the architecture, which can begin to take cues from the angle of the shoreline slopes and the fragile habitats that make up the littoral zone. In order to use water as a means to move, the project would have to float between open water and land, crossing over top and sometimes interfering with this potentially sensitive area. The architecture must respond to this, becoming as minimally intrusive as possible in the way that it ultimately touches the ground. Lightness, both ecological and physical, continues as a guiding principle in this way.

The design begins with the idea that it must transition between land and water, and like the speculative architects, looks to borrow from other disciplines and adapt it to become architecture. The aluminum 'jon' boat was first referenced as an optimal vessel in physical lightness and strength, and because of its capability of being pulled onto shore. Although aluminum is not a material that immediately declares its sustainability, it is a material that understands its lifespan. Aluminum is one of the most recycled materials in the world, and can be fully reused after its current life is over, so long as it can be separated from other materials it was adjacent to. When one understands that architecture is not permanent - as described by Werner Sobek - the deconstruction of architecture becomes as important as the construction itself.[1] Sustainability cannot be defined as Passivhaus efficiency when the meter-thick envelope is sealed together by toxic epoxies, resulting in materials that are destined for the landfill after their current life. This thesis questions this practice, and instead offers the alternative of a deconstructable architecture that is responsible for each piece of its construction, and is aware of its afterlife. Therefore, the choice of aluminum is necessary to resist water and remain both lightweight and durable, but is also the optimal material choice to be disassembled and reused afterwards.

The platform departs from the 'jon' boat formally as it must become lighter and larger, suitable for habitation on its deck. The utility platform is flat on the bottom so it can be dragged onto various terrain, and to provide added stability when resting in the water (in comparison to v-shaped hulls which are designed for stability when moving quickly). The hull is elongated and mirrored on each end, and is paralleled by another hull to minimize material but maximize stability and deck area like a pontoon. The hull walls are constructed like the utility boat, with strategic folds on the inner walls that exponentially increase its bearing capacity, held by v-profile braces that are welded to complete the frame (*fig. 4.04*). The resulting shape of these vessels bears not only the capability to float on water, but to be dragged on top of snow and ice by a snowmobile, as is tradition in northern Ontario. Therefore, the platform is an evolution of the *sled*, a commonplace tool for anyone living in remote areas of Ontario forest. The sleds are hollow, and can thereby become the means for transporting materials

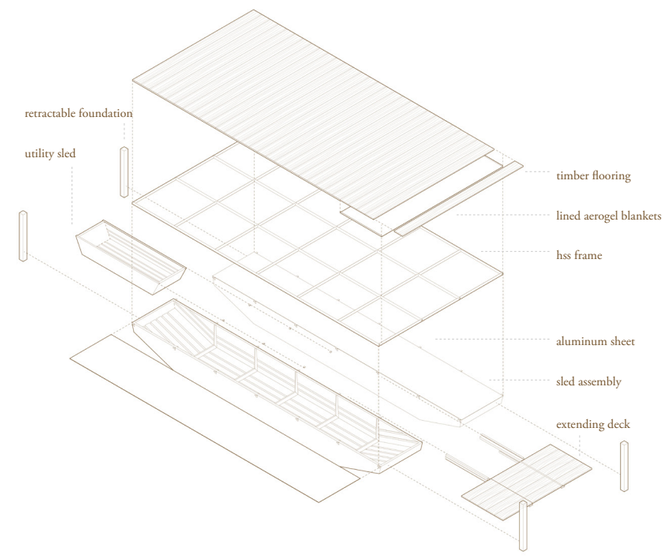
fig. 4.02 (opposite above) The platform assembly occurs in a specific order from bottom-up, with components connecting to the HSS frame.
fig. 4.03 (opposite below) Each of the footing typologies can be interchanged depending on the ground condition.

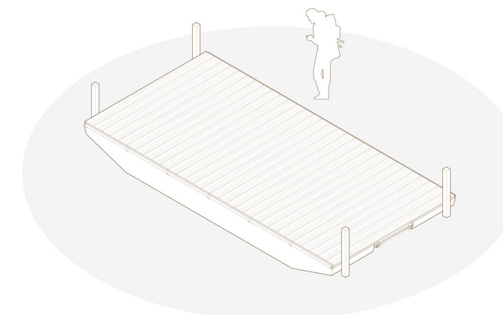
to and from site for construction and disassembly. The architecture begins here, with an understanding that it must be prefabricated in a manner to be transported and constructed by one individual during the winter when the material can be brought to site. These principles inform every decision of the design, making the construction as practical and feasible as possible.

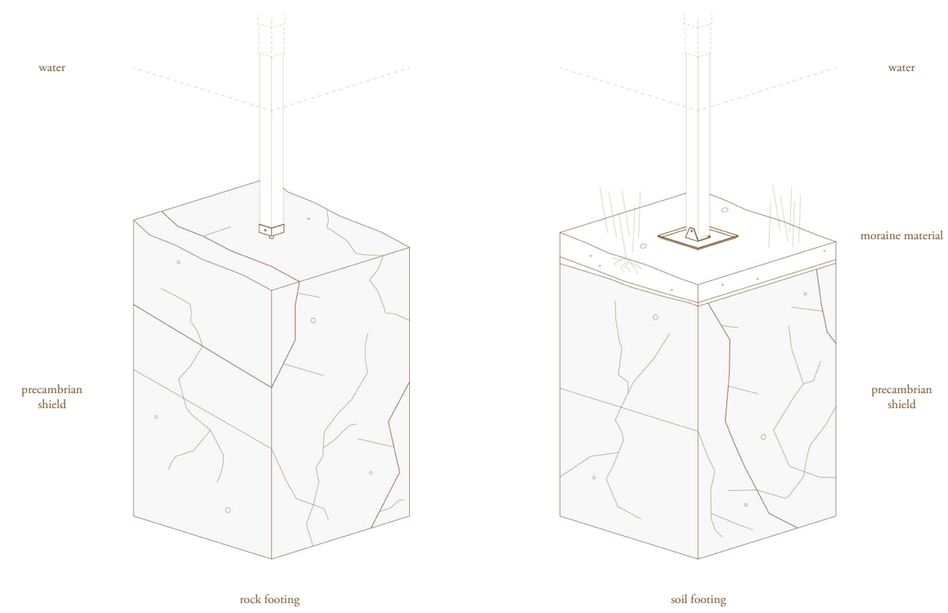
The two hulls are each covered with a sheet of aluminum to seal the assembly and are clamped down by hollow structural sections. These are also constructed of aluminum, bolted to brackets that are welded to the exterior of the sleds. The HSS acts as a lightweight framework of beams and joists for the habitable space above, with cavities for utilities and space to bolt brackets onto. The frame creates a habitable surface of 6m by 3m, similar to that of a pontoon deck. Given this water-borne assembly, the concept of how it could meet the ground was deliberated through design iterations. It was uncovered that the foundation would need to extend downwards to meet the ground and elevate the structure, but also be retracted back when moving. This requires a construction of high weight-capacity and stability, ultimately borrowing from transport truck landing gear: manually-cranked extending legs built of aluminum that encase gear boxes of large ratios. These systems can be scaled and adapted to the project, creating a mobile foundation that is reminiscent of the jack-posts commonly used for cottages on bedrock. The 'feet' on the extending foundations are interchangeable, and the two versions can be used for different ground conditions to minimize the building's impact (*fig. 4.03*). Where rock or firm ground is present below, only a small post width is necessary to support the structure; whereas where muddy soil or sand is present, a wider plate can provide the stability needed. This ensures the project maintains a minimal impact on the shorelines it inhabits.

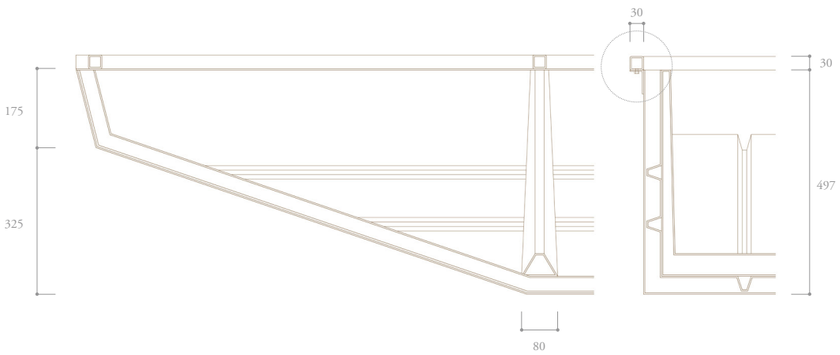
building design

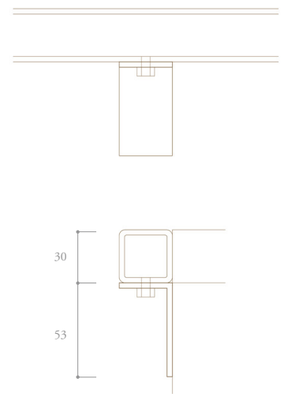
The architecture itself embodies the principles of ecological and physical lightness, sustainability, and forward-thinking in a speculative yet pragmatic nature. Each material was selected by a series of design iterations that explored emerging technologies as building applications, as well as conventional prefabrication and advanced methods of timber fabrication. Like the speculative architects who adapted post-war technologies into their work, today's cries for sustainable building practices must be answered by delving into the world of science and understanding the absolute potentials of materials when











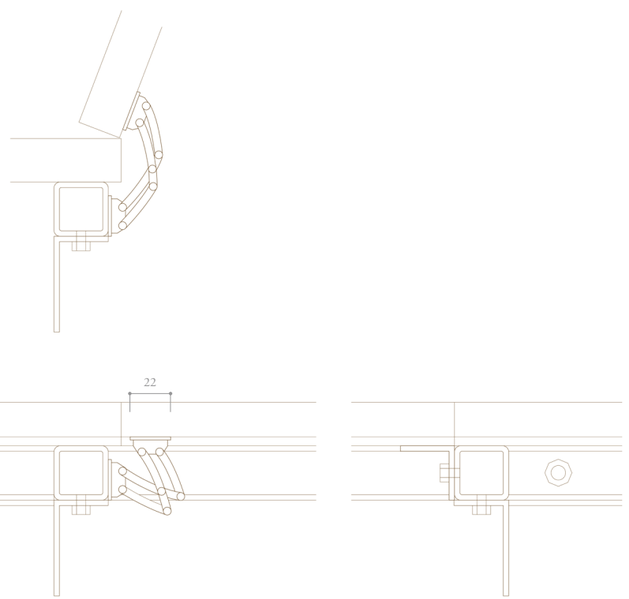


fig. 4.04 Sled Construction Details

fig. 4.05 Hatch Door Detail

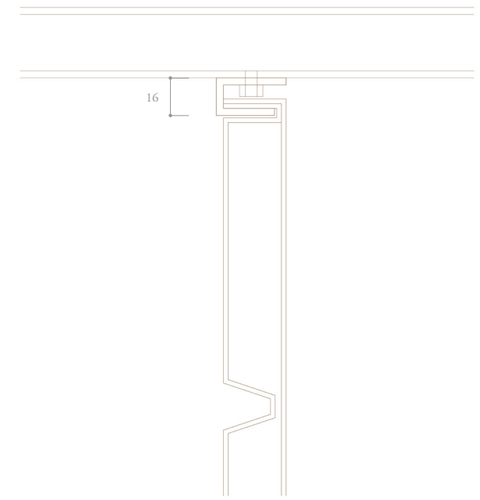
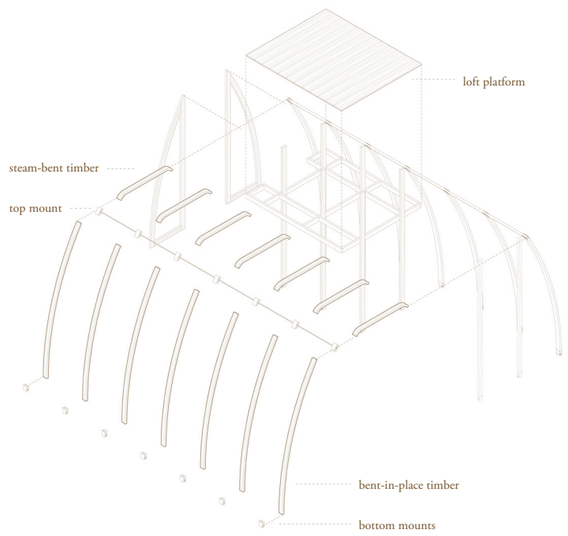
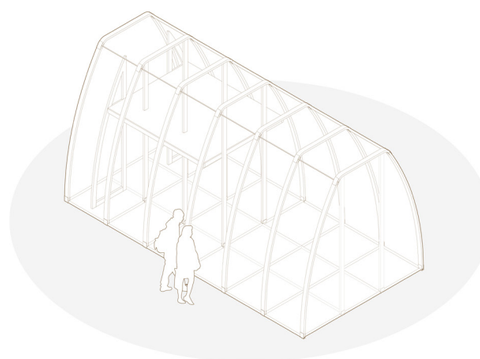
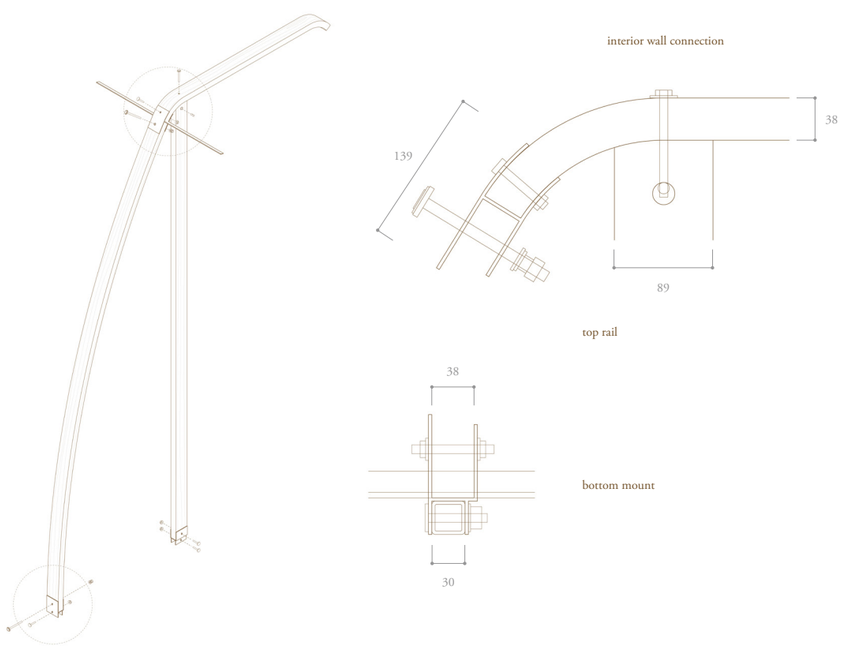


fig. 4.06 Utility Sled Mount Detail

fig. 4.07 Extendable Deck Detail







deconstructed to a molecular level. Advancements in space technology and the possible near-future inhabitation of Mars have surfaced materials that are capable of withstanding the most unforgiving conditions. In particular, *aerogel* - used as ultralight insulation for space shuttles - have been heavily investigated in the last decade as an alternative to conventional building insulation. Aerogel is essentially a gel with its liquid removed through a series of drying processes, resulting in a complex and tight formation of particles that restricts the flow of air to a nano-scale. Since aerogels can comprise up to 99% air, they are feather-light even in large sections. Although typically made from silica sand, the demand for a sustainable building alternative has produced innovations into biodegradable *cellulose* aerogels that still maintain low-thermal conductivity and high mechanical strength.[2] Cellulose is extracted from wood pulp fibres and has its own inherent structure, enabling it to be formed into blankets without adding foreign reinforcements. In order to be incorporated in construction, it must be stretched and pinned into place, and able to be dismounted and either recycled or composted after it serves its purpose as building insulation.

A study of conventional methods of building prefabrication was also conducted to understand how buildings can be compartmentalized and transported to remote locations. Architectural practice Shim-Sutcliffe designed their Harrison-Island Camp around the notion of prefabrication in the Canadian landscape (*apx. 5.01*). They designed lightweight structural insulated panels (SIP's) of plywood glued to extruded polystyrene foam that could be stacked and transported to their remote site via small barges.[3] Although a slight evolution of conventional SIP's construction, the project does not consider the deconstruction of the building through its tectonics, nor the potential off-gassing from plywood glues. In order to fully challenge the next step for this conventional construction, one must consider the potentials of the inherent properties of the construction material: wood. In particular, the structural capabilities of wood when manipulated in certain ways should be exploited as a sustainable means of building, potentially reducing the overall material required for construction.

Rather than panelized construction, the project was conceived as a simple kit-of-parts that only requires bolted connections. Many of the pieces are identical, resulting in a stackable kit that fits within the sleds to be brought to site and assembled in sequence. The main structure of the building explores the potentials of tensile *bent wood*, without altering the state of the lumber in any way. By bending 311cm lengths of 2x4 (trimmed from a 12' board) towards the center of the platform, the walls create an outward tension, pulling on one another to strengthen the entire assembly (*fig. 4.08*).

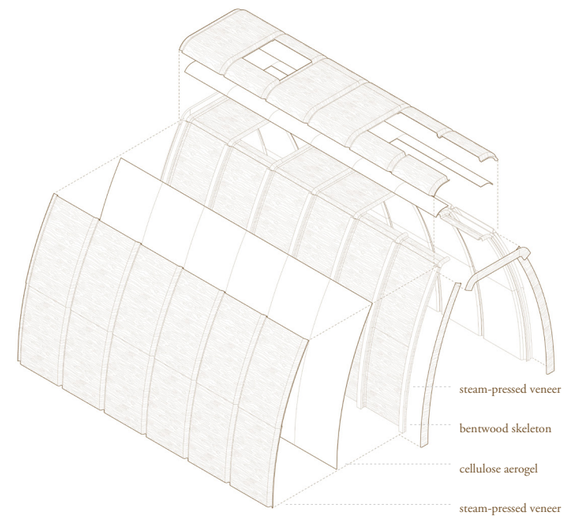
fig. 4.08 (opposite above) The structural components of the walls are lightweight, framed in sequence using various 2x4 configurations.
fig. 4.09 (opposite below) The main connections resemble custom post-saddles that allow the timber to be bent in place. The interior walls are connected with an embedded bolt. *(1:5, mm)*

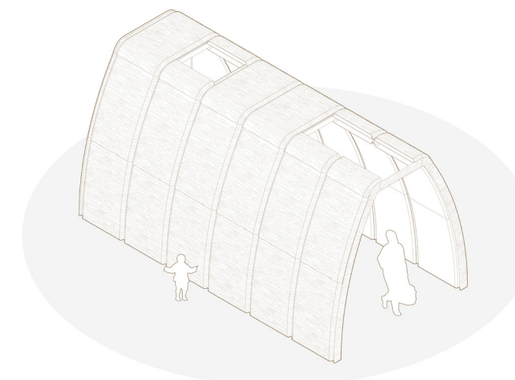
fig. 4.10 (opposite above) The entire wall assembly is timber-based, creating a layered and biodegradable construction system.
fig. 4.11 (opposite below) After the aerogel is rolled above the structural skeleton, the veneer panels are bolted starting with the lower, then overlapping with each above.

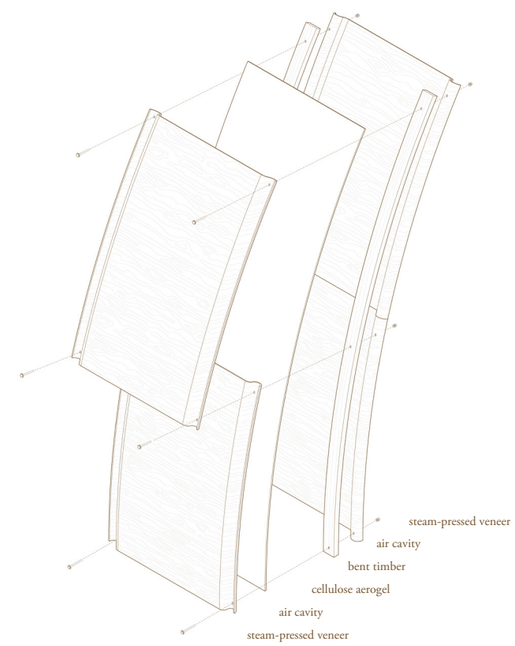
They are held with steam-bent 2x4's at the roof and a simple aluminum saddle frame that is bolted together to create a seamless profile. At their base, a similar saddle is bolted to the HSS frame, ensuring the wood cannot ricochet outwards in either location. The overhead beams are connected to 2x4 posts that mount to the platform, resulting in an equilibrium between the structural components that are pulling in different directions and exploiting the elasticity of the wood fibres. This also necessitates far less framing material, acting like carbon-fiber tent rods that are threaded through tent coverings and anchored to the ground. Albeit unconventional to architecture as a practice, these principles have already been perfected by the Anishinawbek wigwam typology for millennia.

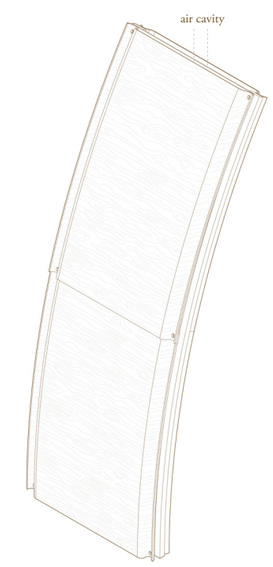
Atop this framing, the cellulose aerogel can be unrolled over the roof and down the walls, requiring only temporary clips to hold it into place. The exterior cladding and bolts were designed to pinch the aerogel to span between the 100cm spaces between each bent frame. This assembly is designed for the long sides of the platform, and so there are six module sections along each of the lengths. The cladding design stemmed from an exploration of an alternative to plywood, where a woven timber-lattice wall was envisioned as an interior finish, inspired by the diagonal lattice work of the yurt (*apx. 5.13*). This circled back to the fundamentals of laminated timber, combining plywood and wood-weaving with relatively untapped fabrication processes for timber in architecture: steaming and vacuum-forming. Used in furniture making (and especially by Charles and Ray Eames), pressed layers of wood veneer with glue is common practice. However, steaming the veneer creates memory in its fibres without destroying them, allowing it to hold its shape. Vacuum-pressing using biodegradable glue could also create the envisioned lightweight shell, but by steaming the veneers beforehand, the assembly would not require any form of adhesive. Therefore, the exterior and interior cladding are 1m x 1.5m panels of steam-pressed veneer that interlock and overlap strategically to prevent water infiltration (*fig. 4.14*). The timber choice is crucial as it must have inherent resistance to rotting and insects in order to remain untreated and return to the earth after it serves its purpose. Locally-sourced white cedar is a common selection for siding because it contains these properties, and as it ages, it patinas to further protect itself from the elements.

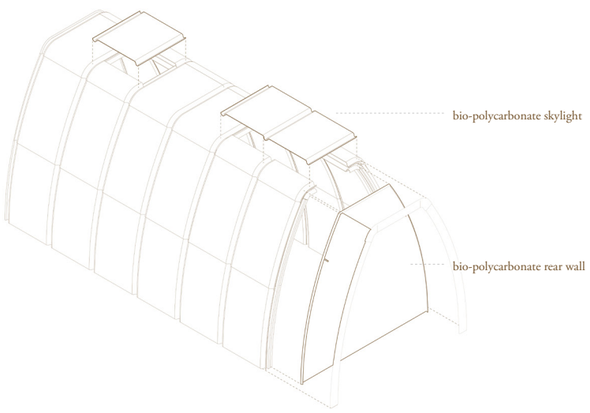
These panels act as large shingles, utilizing overhanging drip edges where the bolted connections meet. The shape of the panels create strategic air cavities within the wall: on the outside of the aerogel, the air gap ensures the wood can dry after it is wet; on the inside, the gap provides space for utilities and wiring as well as takes advantage of the stack effect to circulate air vertically and exhausting it through the permeable assembly. The perpendicular wall that

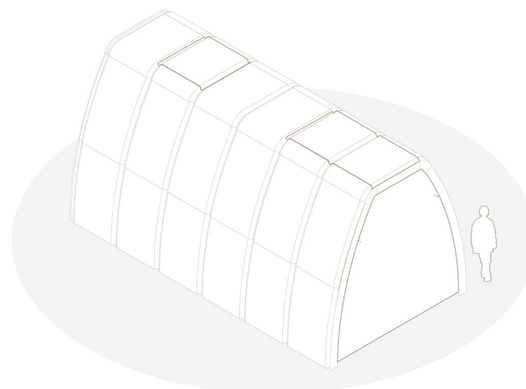


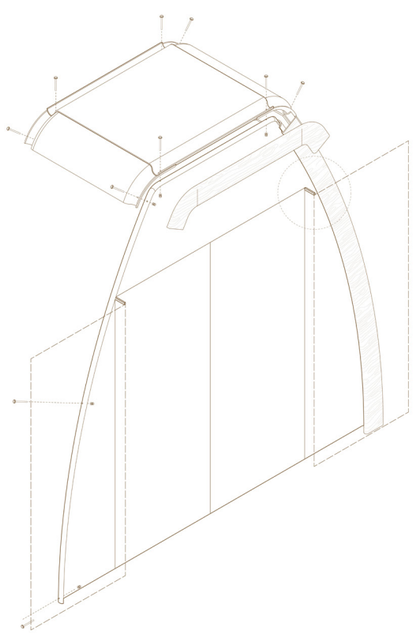


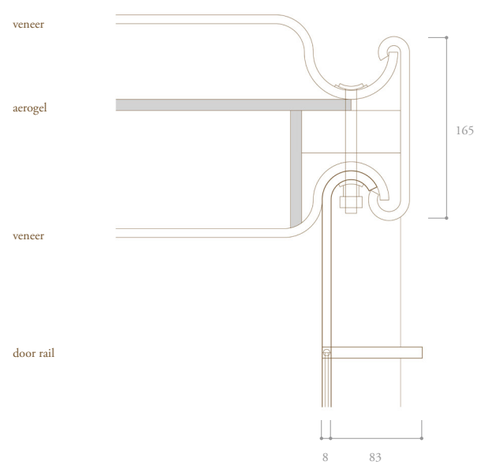










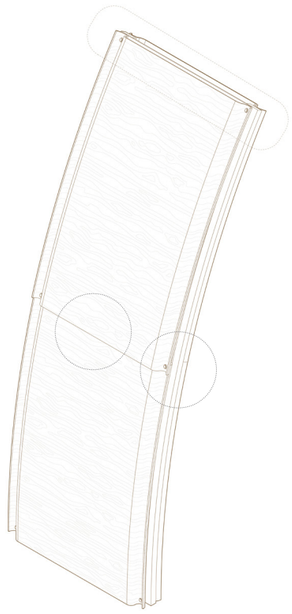


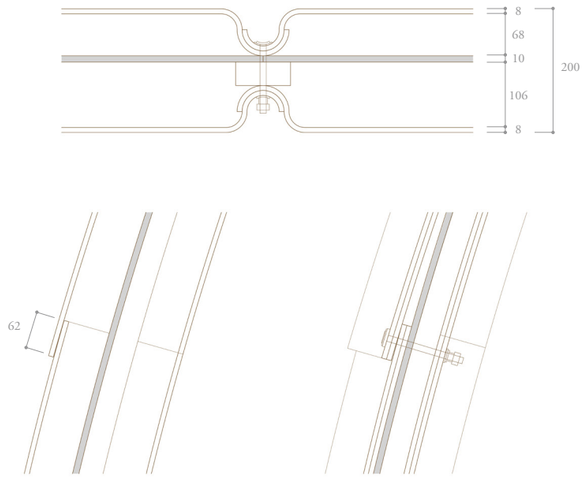
occupies the shorter width of the platform at the main entrance is an adapted construction from the main walls. It utilizes the steam-bent veneer in a simpler manner, flaring along the outer edges to create a sealed condition, but does not require the same cavities. This keeps it lightweight, but constructed in the same language as the rest of the project. After the building is no longer needed, these walls can be either left on site to compost or burned as fuel.

The rear wall adjacent to the large living space, as well as three of the six ceiling modules, are constructed using clear sheets of *bio-polycarbonate* derived from glucose. Compared to glass, bio-polycarbonate is lighter, shatterproof, easier to manufacture, and has similar light transmission and thermal properties.[4] Traditional polycarbonate more than doubles glass in embodied CO^2 emissions by weight, but the plant-derived polymer that replaces biosphenol-A (BPA) drastically reduces the environmental impact. These sheets can be dismounted and reused in other ways after their life in this project. They are formed using the same method as the cedar cladding using a vacuum press, creating curved edges that overlap to seal and bolt the assembly. The bio-polycarbonate wall has double doors that slide outward on a rail in order to open the rear wall to the lake (*fig. 4.13*). A retractable insect screen is mounted above and can be pulled down to create a 3-season room that allows fresh air to circulate inside.

The floor is constructed of white cedar planks that span the platform width, and a sheet of aluminum-lined cellulose aerogel below protects it from any splashing water. The cottage splendor of sitting on a wooden dock on a hot summer day is another experience that could not be excluded from the design. An extending rail mounted to the underside of the HSS frame between the sleds holds a timber deck that flips outwards, creating a cantilevered dock that can be tucked under when not in use (*fig. 4.02*). In addition, a smaller utility sled, constructed in the same manner as the two main sleds, slides into a rail on the opposite end of the platform below the deck (*fig. 4.02*). This can be utilized when dragging firewood or can be towed behind a utility vehicle with supplies throughout the year.

fig. 4.12 (opposite above) The bio-polycarbonate panels are the final sections to be bolted into place.
fig. 4.13 (opposite below) Overlapping and bolting the rolled edges ensures a sealed edge in both plan and section. *(1:5, mm)*





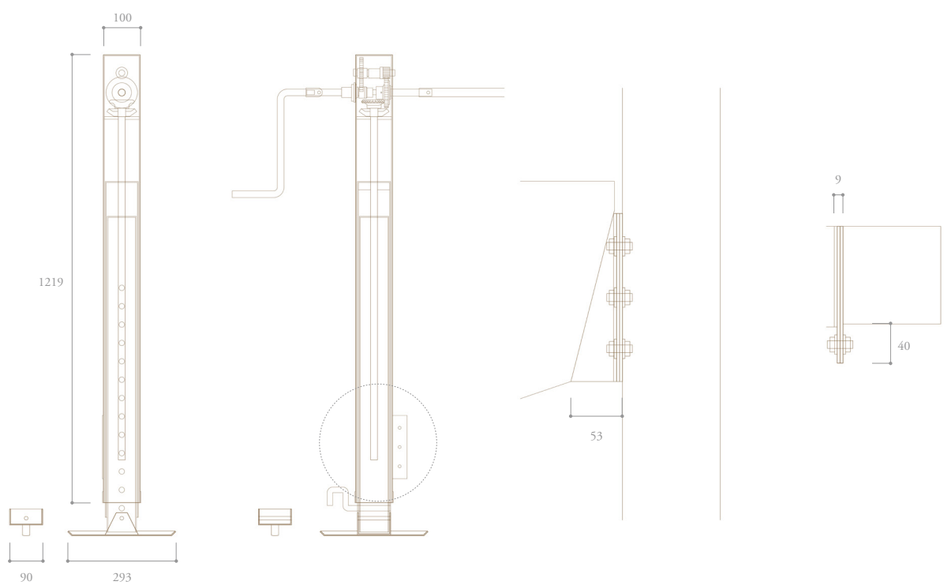
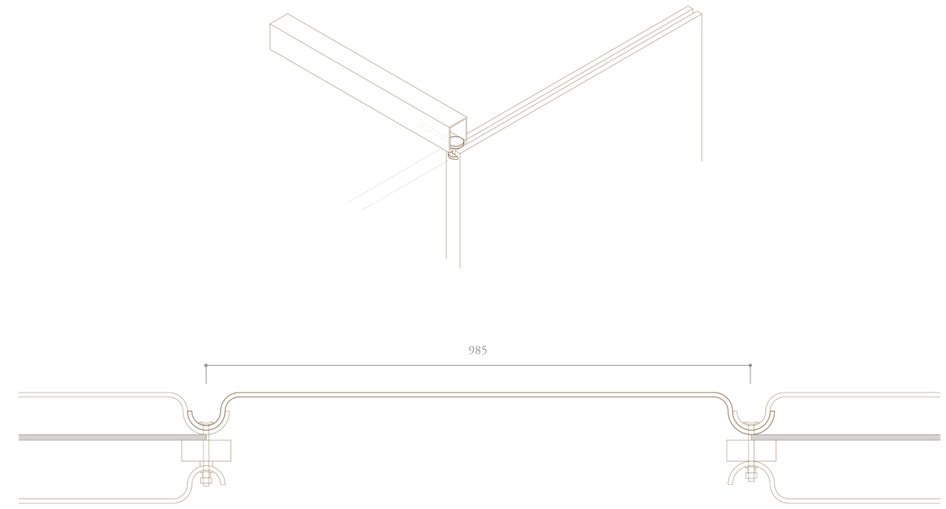


fig. 4.14 Panel Construction Detail

fig. 4.15 Extendable Foundation Detail



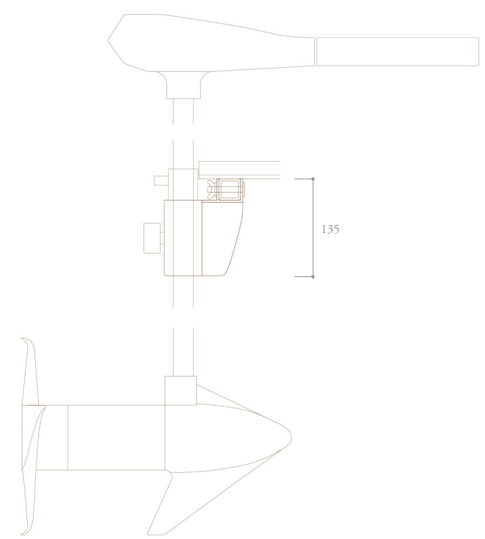


fig. 4.16 Polycarbonate Details

fig. 4.17 Trolling Motor Mount Detail

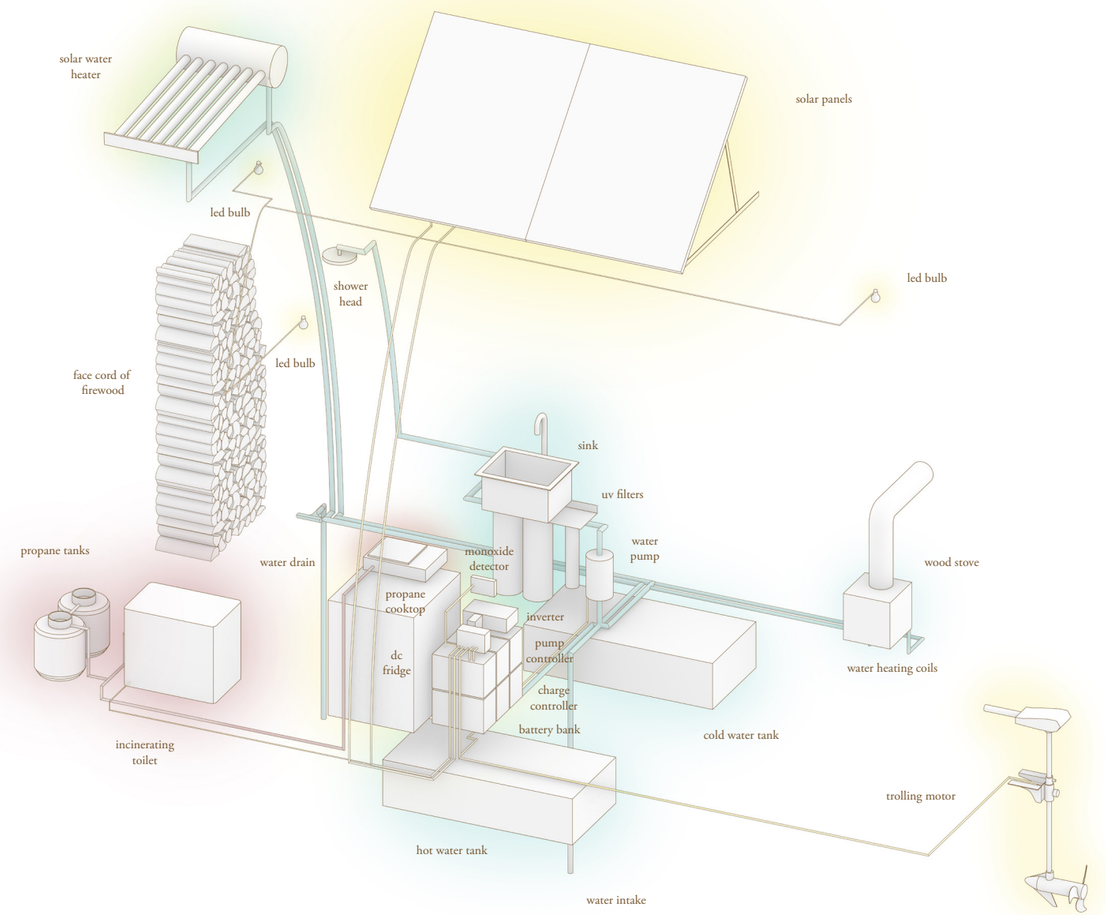
embedded systems

fig. 4.18 (opposite) The systems are embedded into the construction, designed in tandem rather than applied.

The interior layout is largely determined by the systems required to operate off-grid, determined by solar load calculations, and by refining these dimensions into contained spaces. The three categories of systems - water, electricity, and gas - are then positioned by determining their functional output and what their necessary adjacencies should be. The shower, sink, water filters, pump, and solar water heater are positioned on one side of the floor plan to ensure simple and direct lines of piping. On the opposite side, the propane tanks, incinerating toilet, and cook top are also conceived in a linear manner to create straightforward hookups. The electrical components (solar batteries, inverter, charge controller, pump controller, solar fridge, LED lights, trolling motor, monoxide detector) are contained as much as possible in one location, aside from small wires that feed the appliances around the building. These can be fed through the cavities in the wall sections. The electrical and water hubs are encased in vacuum-formed veneer cabinetry that follows the same design language as the rest of the architecture.

The overall cost of the design as a unit is $53,876, subject to fluctuation with time as prices will change. COVID-19 has dramatically increased the cost of lumber, so many of the components are three-fold the price that they were just a year ago. One of the largest fees is attributed to the cedar veneers that make the panels, which equates to roughly $8,100. However, this can be cut to nearly zero if one has access to a rotary lathe that is used for manufacturing plywood, since the tree can be harvested using the building products license. If there were multiple of these buildings being produced, it would make economic sense to purchase a rotary lathe rather than outsourcing large quantities of veneer.

With this, the construction of the building is complete. The user now embarks on their annual cycle, beginning by remaining stationary on the ice until the spring melt. The design is a vessel for an experientially rich lifestyle, democratizing the beautiful, simple luxuries of living in a lakeside cottage.



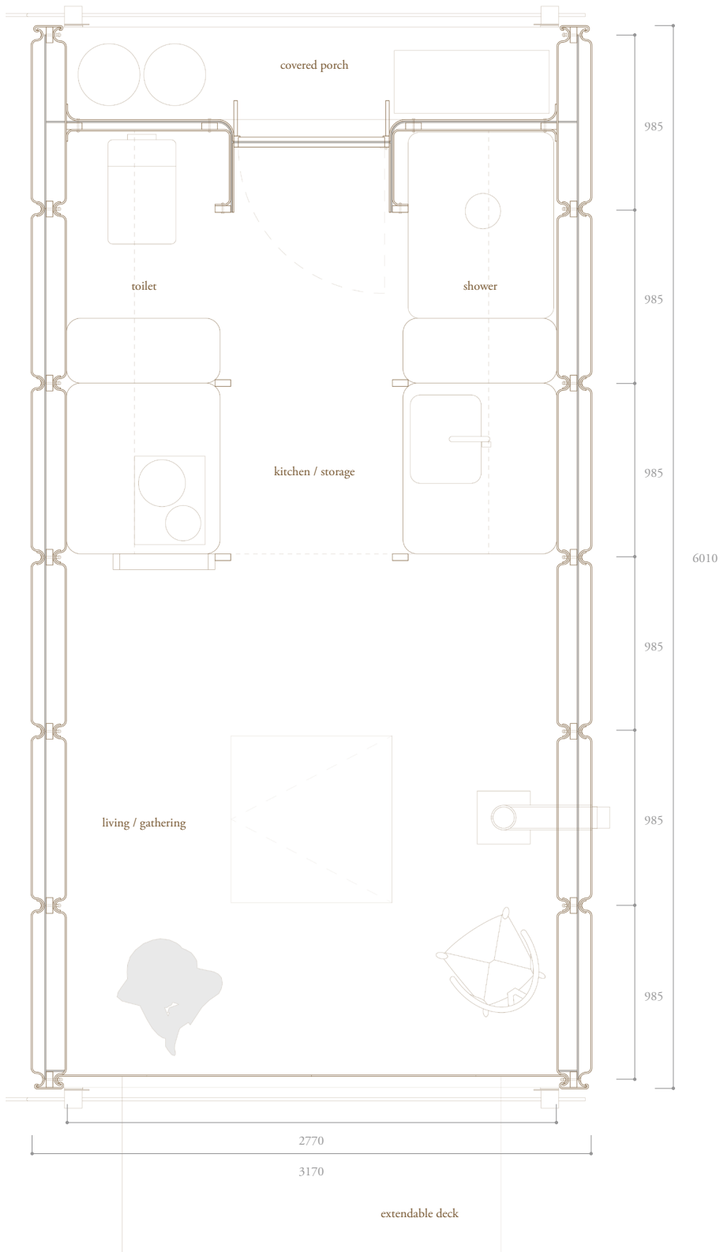


fig. 4.19 Ground Floor Plan *(1:45, mm)*

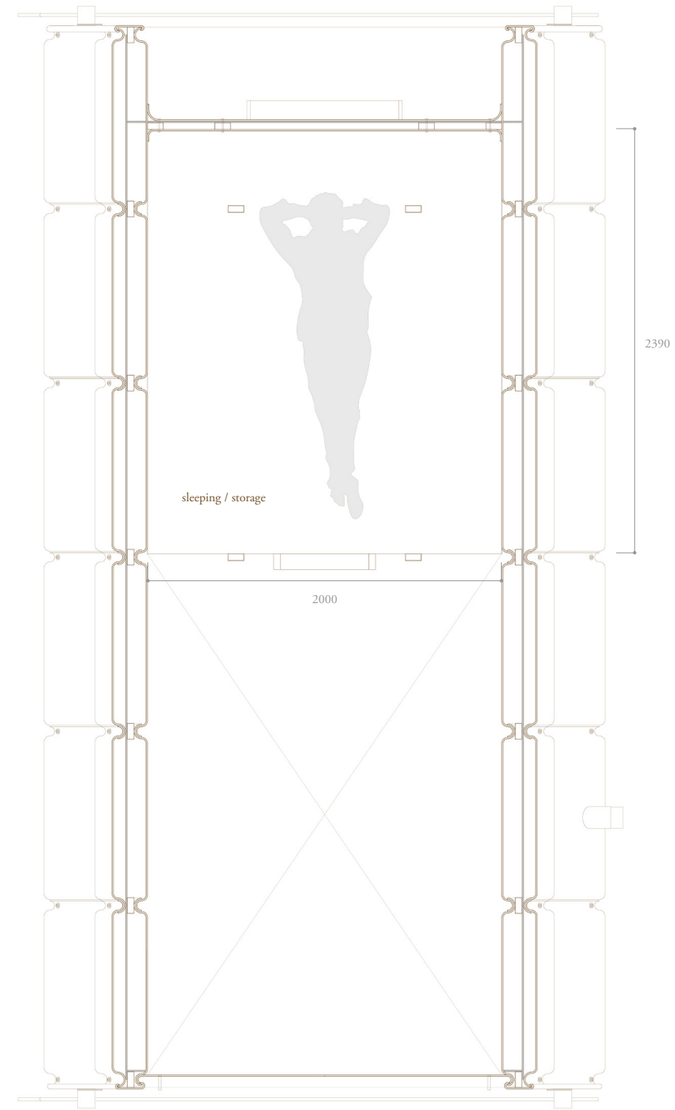
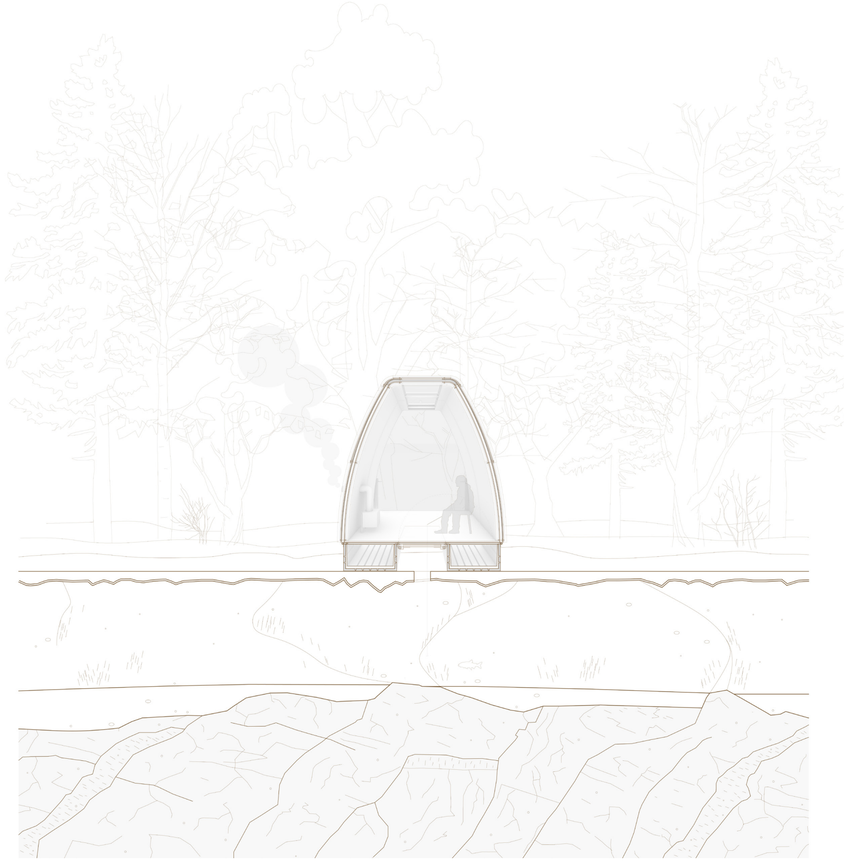
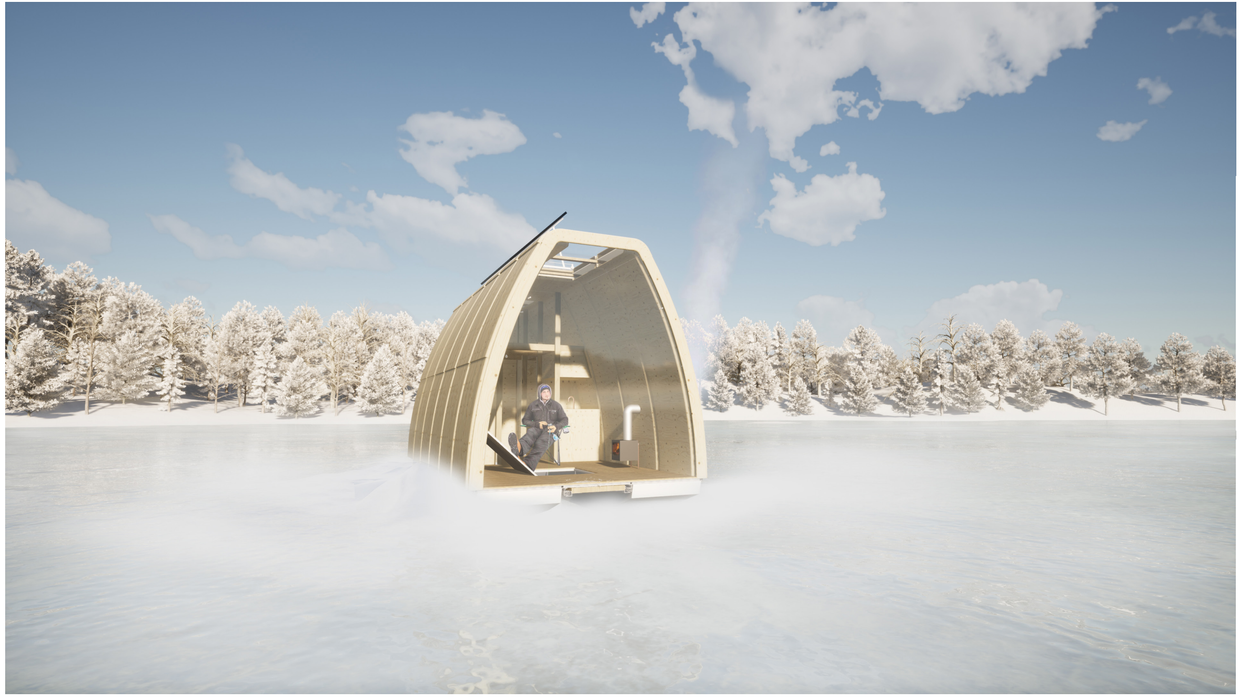
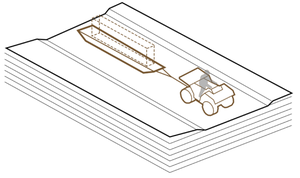


fig. 4.20 Loft Plan *(1:45, mm)*







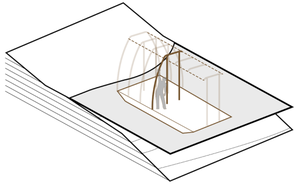
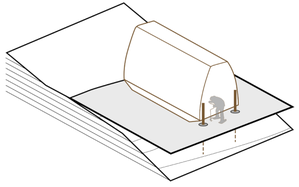
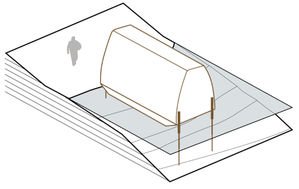
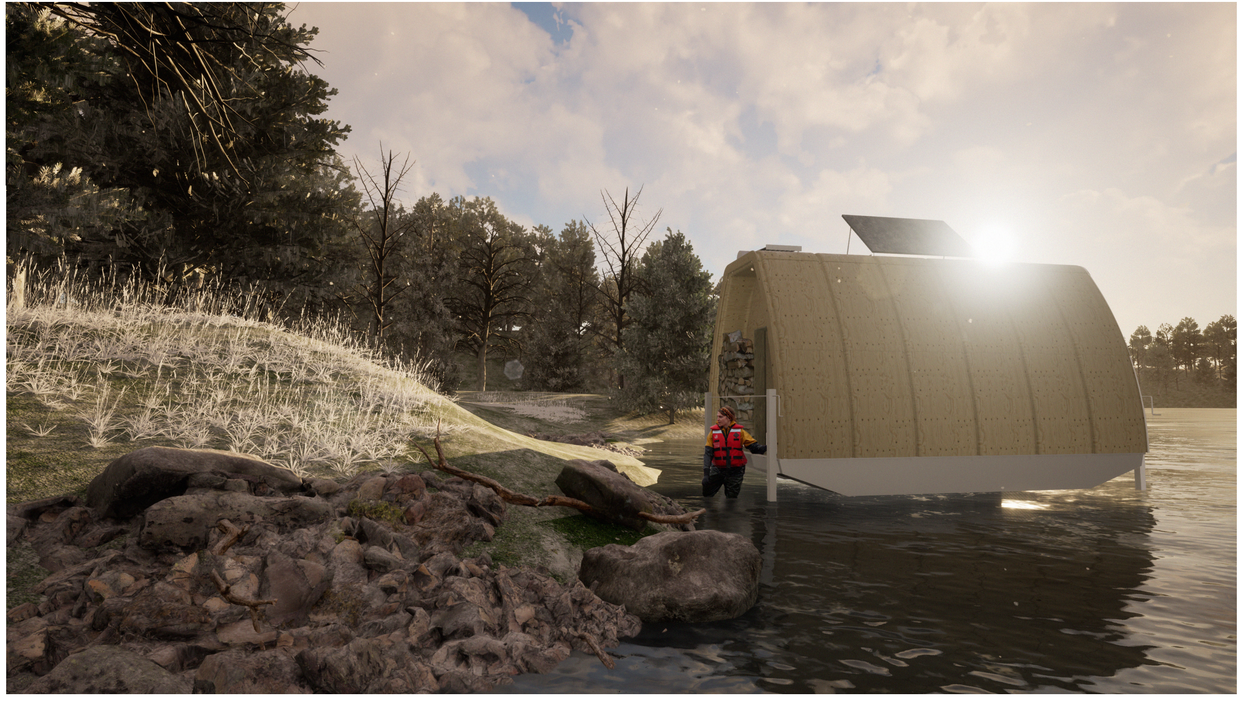


fig. 4.21 (left) The ice fishing hatch is utilized in order to remain stationary for the winter. *(1:80)*
fig. 4.22 (center) The unit becomes embedded into the landscape during the harsh winters, truly becoming a refuge.
fig. 4.23 (right) The assembly is towed onto the ice and then assembled in the described order.

fig. 4.24 (left) Holes are augered through the ice as the user prepares for the spring melt.
fig. 4.25 (center) The spring very slowly brings warmer days, with snow regularly lasting until May.
fig. 4.26 (right) The correct footing must be utilized to meet the ground condition as first contact is made. *(1:80)*







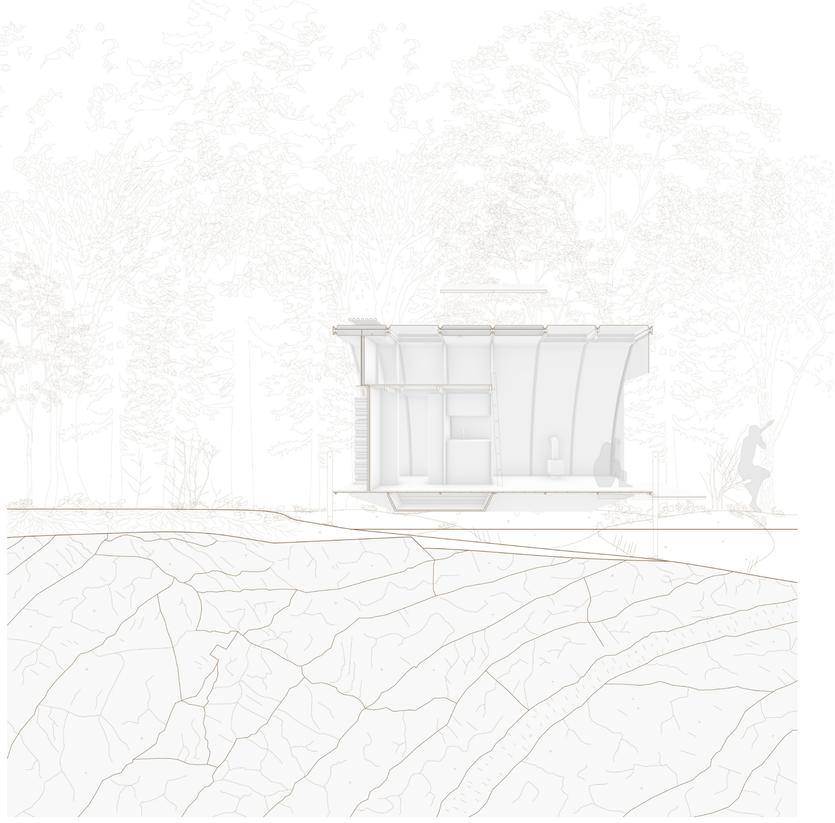
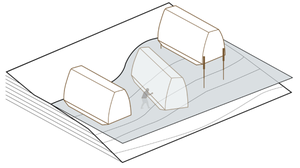


fig. 4.27 (left) Softer soil necessitates the wider plate footings. *(1:80)*
fig. 4.28 (center) The bio-polycarbonate wall frames the landscape and opens to the lake, embodying the feeling of a summer cottage.
fig. 4.29 (right) The building is floated along the shore every 21 days. The extendable deck is pulled out during the warmer weather.



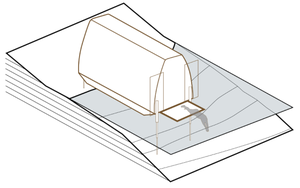
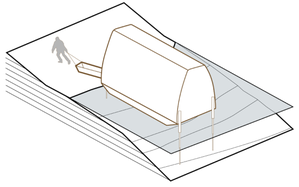
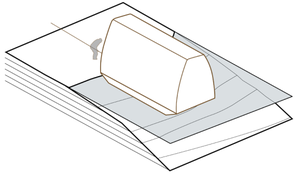
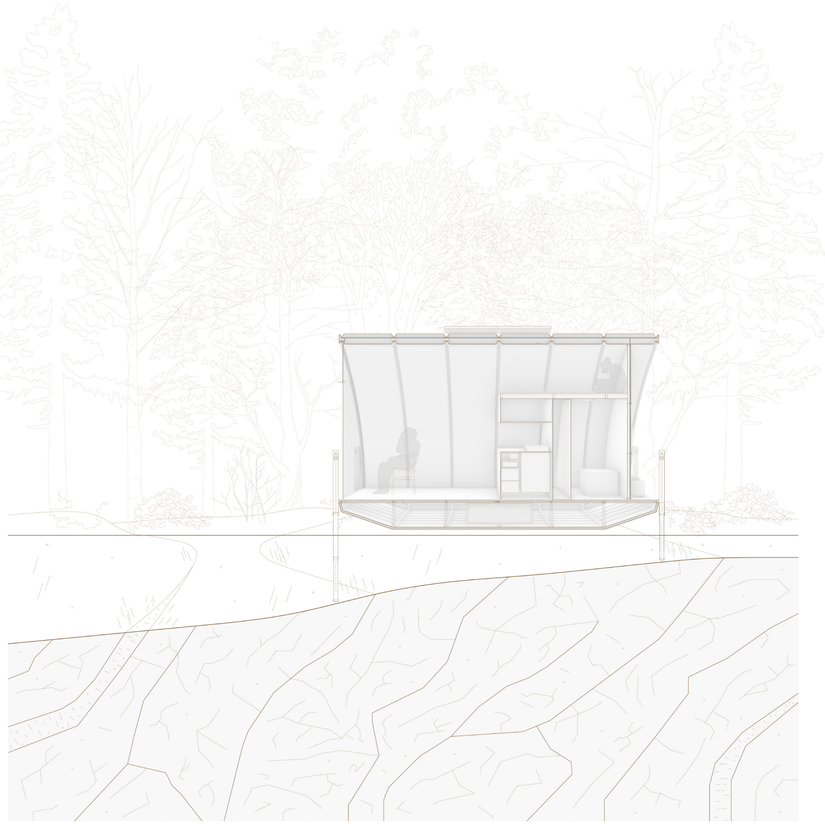
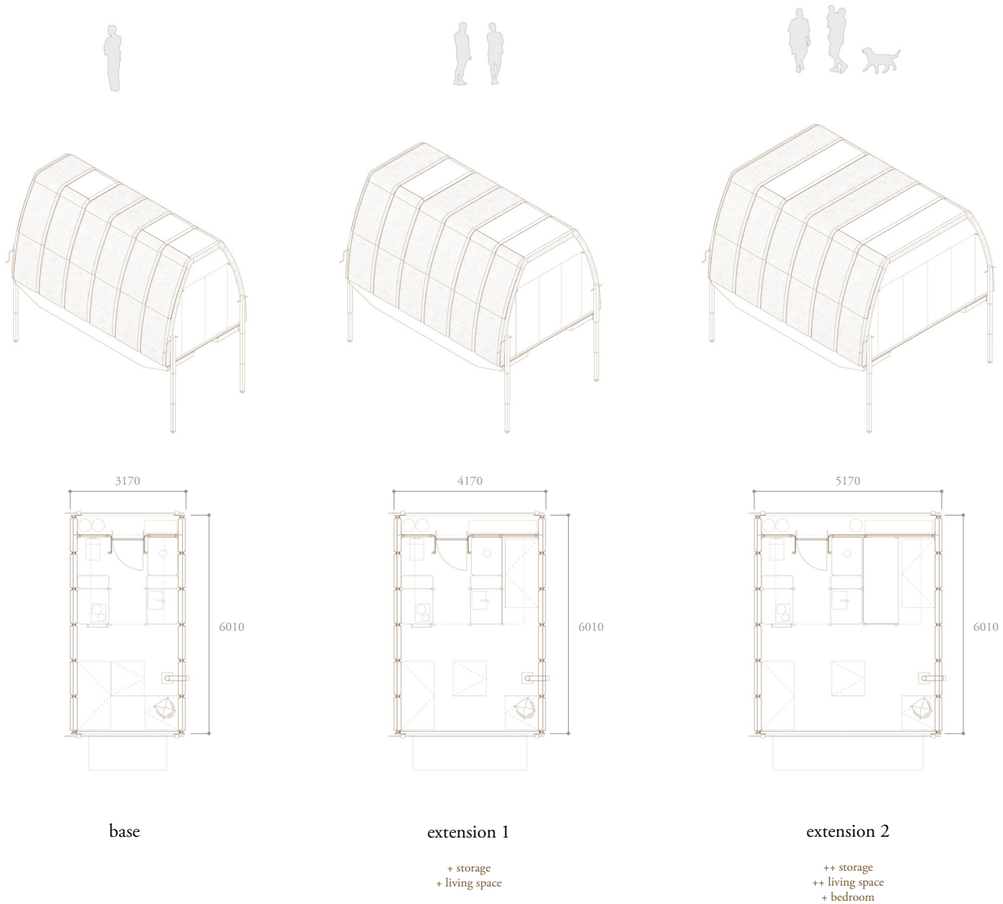


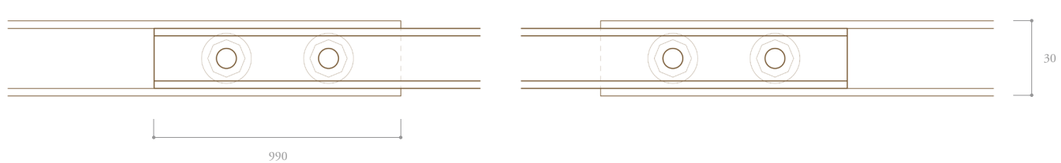
fig. 4.30 (left) Three weeks prior to the lake freeze, the building must be beached where suitable.
fig. 4.31 (center) The autumn is spent preparing for winter, utilizing the utility sled stowed below deck.
fig. 4.32 (right) An insect screen transforms the interior into a 3-season room. *(1:80)*











DISPERSION

zooming out

As the first year of inhabitation comes to an end, the project has proven to be a viable way of living. With this, friends of the initial users join them on the lake and begin to form a vibrant community. Multiple structures populate the lake, and the users strategically plan their annual cycles to align with each other. Perhaps some of them telework for the same office and do their annual cycle together, or some of the users are in school and plan to overlap their cycles from the autumn to the spring. Scenarios like this are ever-expanding and create a dynamic range of paths that instigate interaction and strengthen communal activities (*fig. 4.35*). Neighbours are life-long friends for cottagers and especially ones in this remote setting; they would share duties such as cutting firewood and storing it in accessible locations around the lake. Some people might have outdoor expertise that becomes invaluable; others may have a medical or trades background and can help one-another in emergencies. Although the users grow in number, their ecological and physical impact remains light because the architecture fundamentally minimizes it. Anyone who would live here would be consciously seeking to reduce their footprint on the earth in the first place, so if every user has these same intentions, they are living a more sustainable lifestyle. When they choose to leave the lake and the building no longer has the same function, it can be easily dismantled and separated by the two material classifications: biodegradable or recyclable (*apx. 5.14*). The sleds can be filled with the bolts, brackets and systems, while the untreated timber and aerogel can be burned or left on site to return to the earth.

The project is designed with growth in mind as well, with an easy solution to expanding the size of the unit. A longer top beam could replace the former, and extra cladding and aerogel would be overlapped above and bolted. Below, the sleds can be pulled apart by introducing a coupling HSS that slips inside the existing frame, separating them to the required distance (*fig. 4.34*). These can then be bolted together, and new flooring planks can be laid to fill the separation, completing the structural assembly. Different floor plans are envisioned to suit different family sizes and lifestyles: from one to two people, to perhaps a young couple, and finally a family (*fig. 4.33)*. This way, the project does not become obsolete after a few years if the users' lives change. After all, this project is founded on a generation of people who are unequipped to afford housing: if this project was their solution, they would likely remain for some time, and so the architecture needs to respond. Each expansion typology increases the width by a meter, with the first including a storage room with a hatch, and the larger including also a bedroom.

fig. 4.33 (opposite above) The three different configurations ensure the occupants can grow with the building, reinforcing its layered sustainability (*mm)*.
fig. 4.34 (opposite below) Coupling HSS detail *(1:3, mm)*

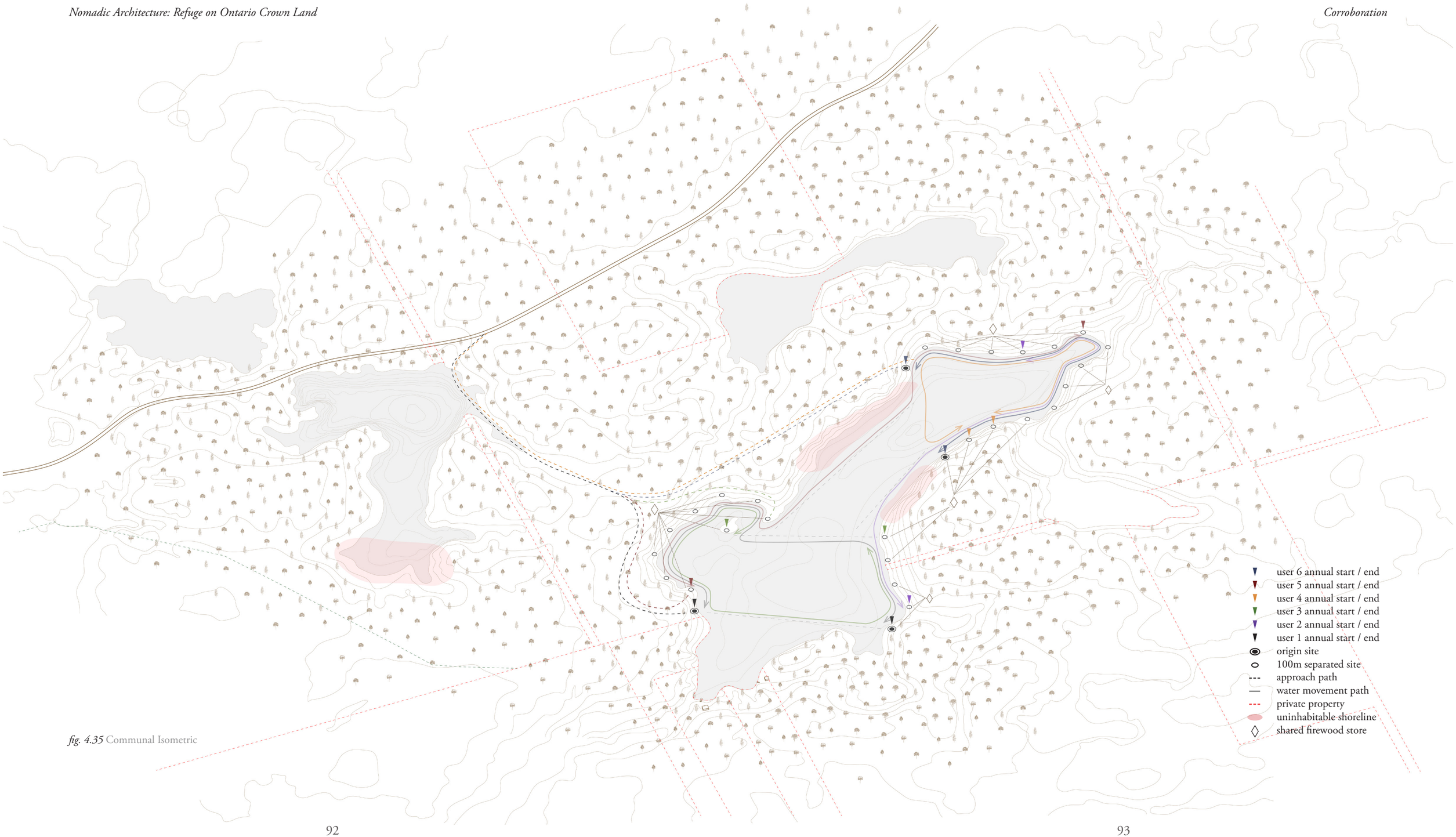


fig. 4.35 Communal Isometric

fig. 4.36 (opposite) The structure can be deduced into a kit-of-parts manual that can be multiplied and reconfigured. *(1:175)*

With this, the project becomes a kit-of-parts that can be altered and interchanged to suit the user. Each of the components could be ordered or manufactured when required, resembling a furniture catalogue. Like the inner workings of Crown Land through this entire process, the building too becomes open-source. Its construction and components are not confidential like most architecture, but are instead common knowledge. The democratization of the assembly parallels the thesis philosophy of democratizing Crown Land: making them both available to the public allows for people to do as they will with the knowledge.

conclusion

The building fulfills its conceived role as a receptacle for an ecologically and physically light lifestyle. Its construction attempts to redefine typical building tectonics in cold climates by carrying throughout its principle of deconstruction. By understanding the inherent properties of timber, it better exploits the material's potentials and concurrently eliminates the need for glues and plastics in the envelope. By working within the allotted Crown Land laws, the project creates a new lens to reflect on the dialogue of the nations' history. The land was taken from its original inhabitants, and accordingly the building personifies its critique through its physical and philosophical stance. By not owning the land but living on it legally, the building and its users simultaneously: echo the ideologies of the land's first keepers; oppose the invasive approach of the Crown; and reject our society's expectations of material accumulation. The project is not intended to, nor has the capability to become a solution for this generational housing crisis. People have different needs, and this lifestyle is particular to a kind of person who is seeking an alternative. With this being said, it can however provide a life of a slower pace that is focused on one's well-being while being tethered to reality.

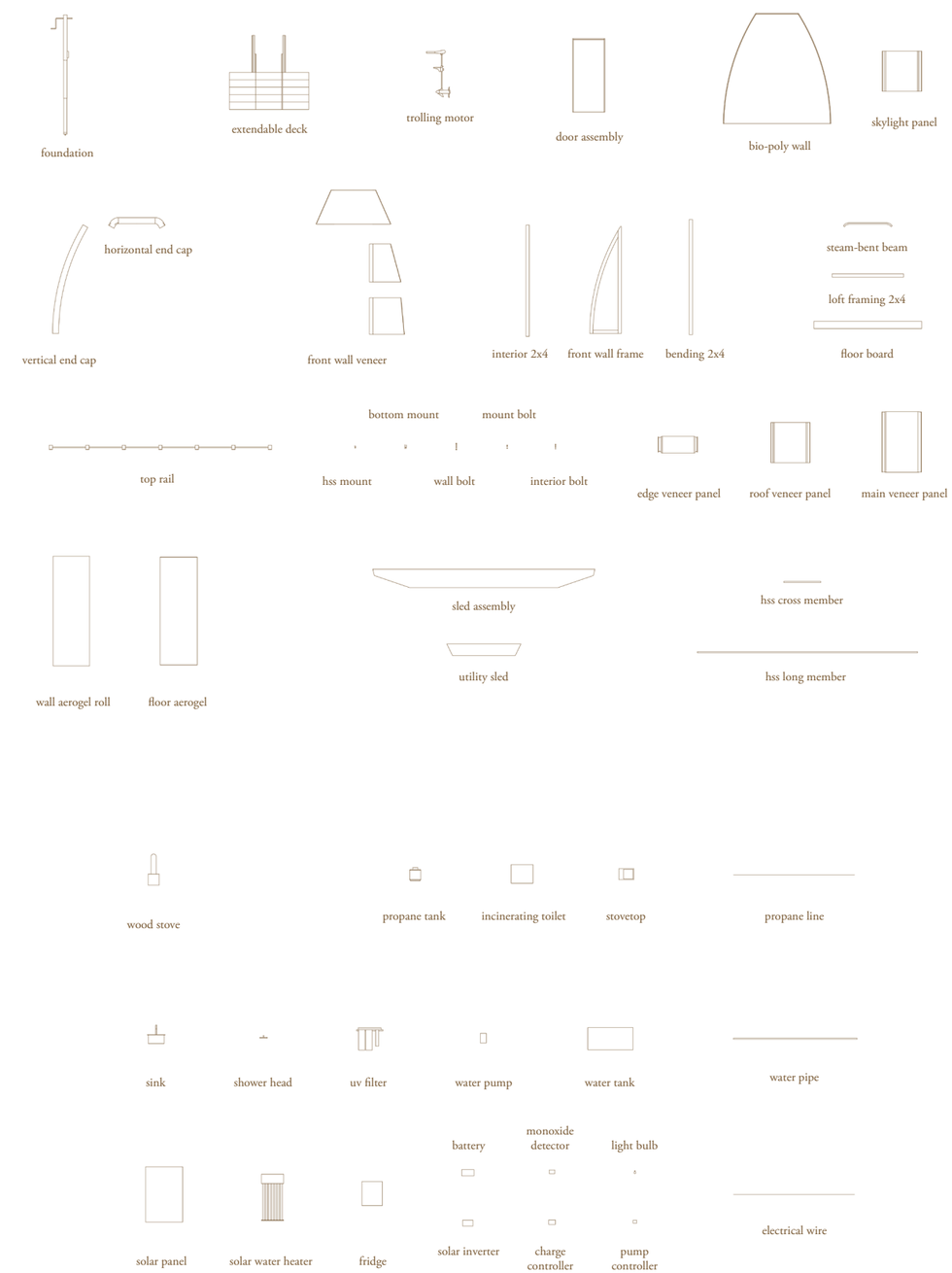
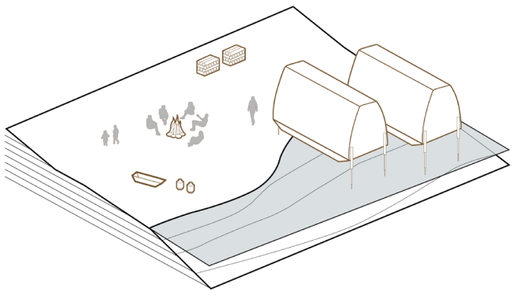


fig. 4.37 (below) As the first year passes more users move to the lake. The community becomes vibrant, sharing duties and supplies, and grows in number.
fig. 4.38 (right) The project grows as it becomes public knowledge, and the community populates the lake. The structures glow like lanterns along the shore as users gather around a fire.



NOTES - PART FOUR

1 Werner Sobek, "Architecture Isn't Here to Stay: Towards a Reversibility of Construction," in *Re-Inventing Construction*, edited by Ilka and Andreas Ruby, 34-45 (Berlin: Ruby Press, 2010), p 37.

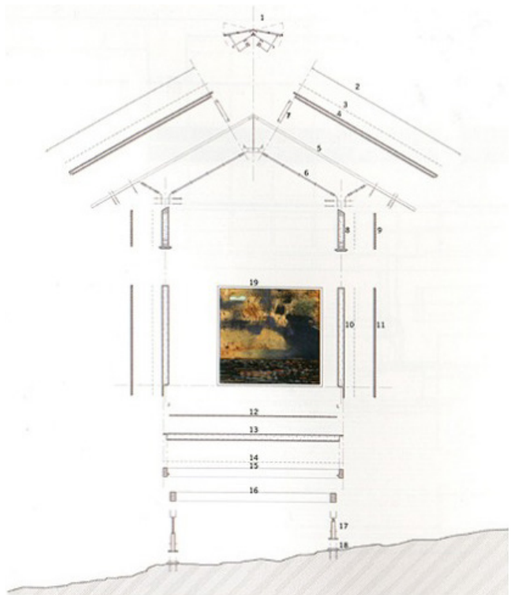
2 Lin-Yu Long, Yun-Xuan Weng, and Yu-Zhong Wang, "Cellulose Aerogels: Synthesis, Applications, and Prospects," *Polymers* 10, no. 623, (2018): 18, doi:10.3390/polym10060623

3 Essy Baniassad, *Shim-Sutcliffe: The Passage of Time*, (Halifax: Dalhousie Press, 2011), 68.

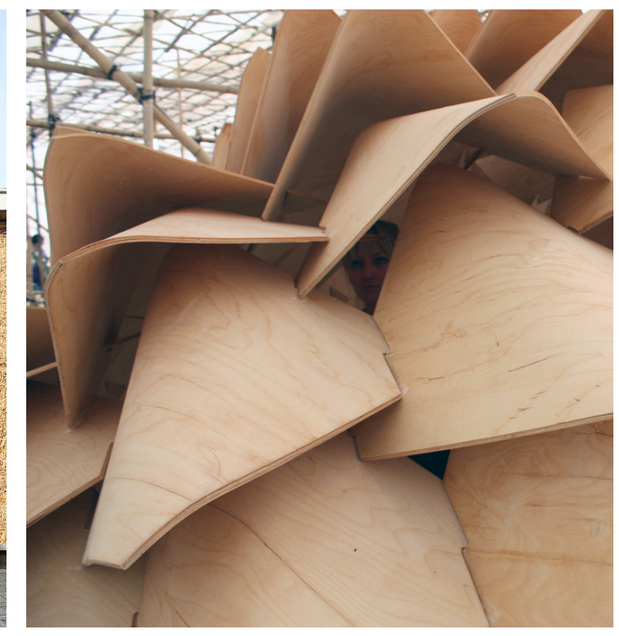
4 Seul-A Park, Youngho Eom, Hyeonyeol Jeon, et. al, "Preparation of synergistically reinforced transparent bio-polycarbonate nanocomposites with highly dispersed cellulose nanocrystals," *Green Chemistry 19*, 31 July (2019): 5212-5221, https://doi.org/10.1039/C9GC02253H

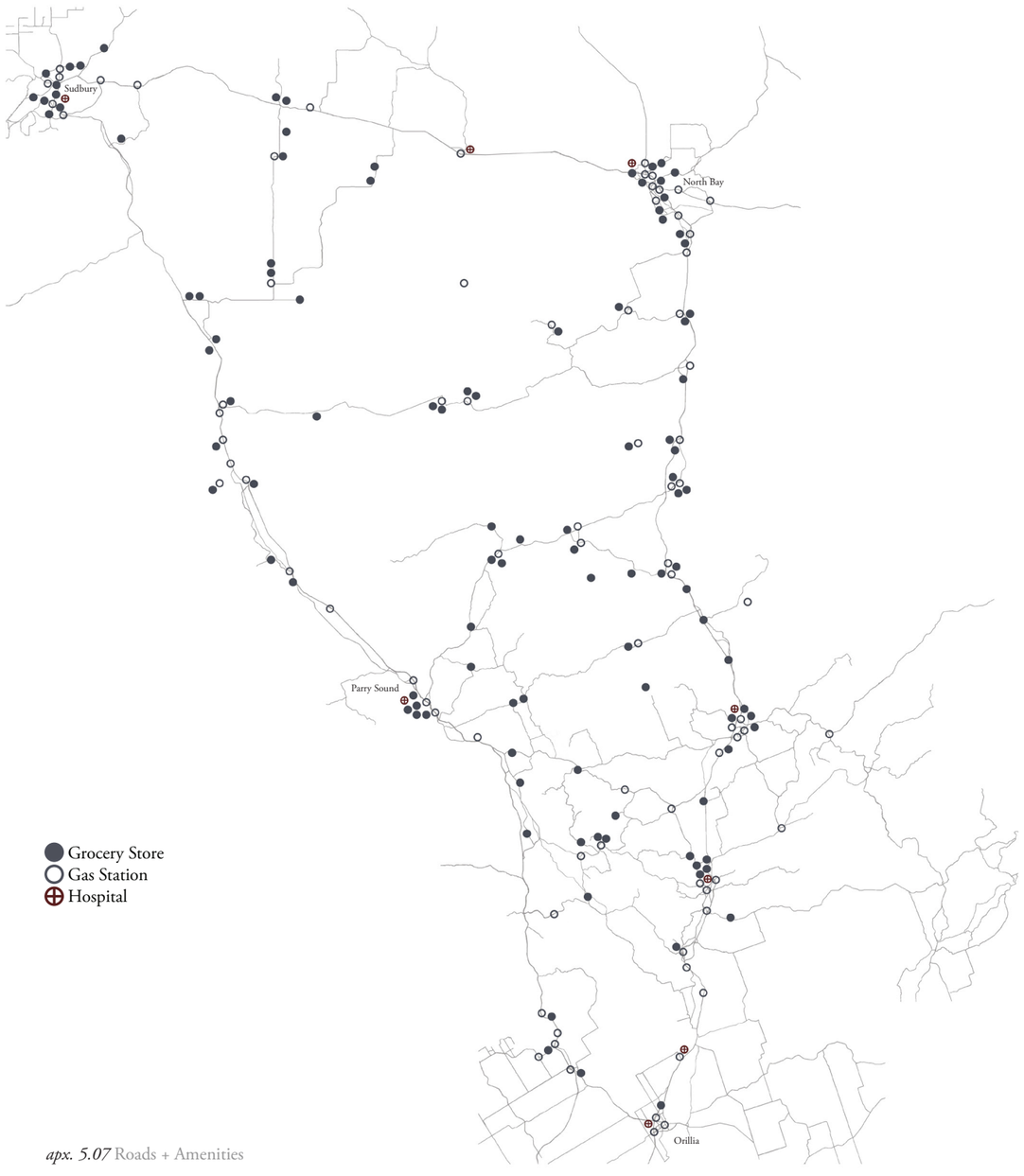
PART FIVE

APPENDICES

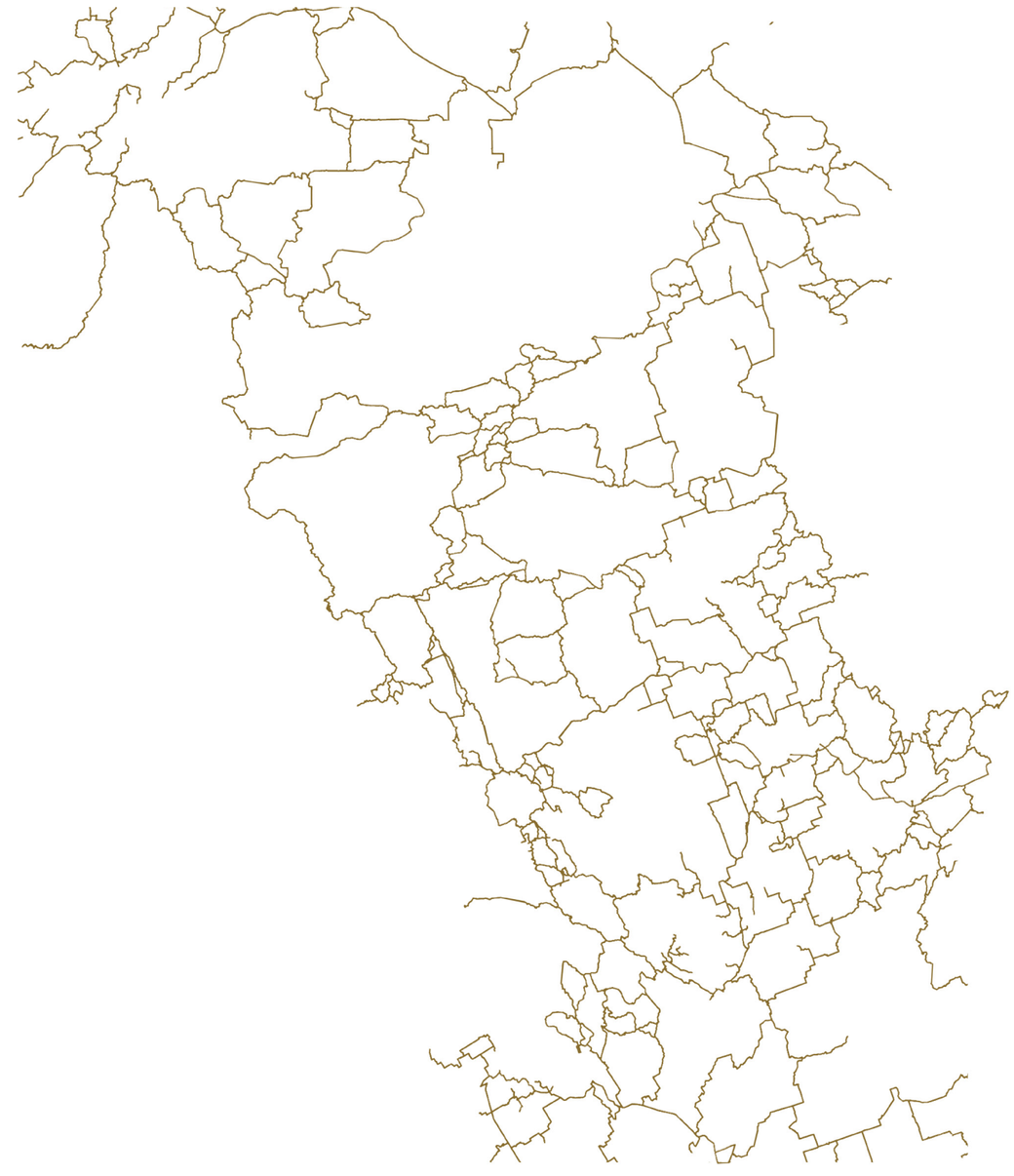


Precedents that helped inform the project design (from top left)
apx. 5.01 Shim Sutcliffe, Harrison Island Camp
apx. 5.02 Renzo Piano, Diogene
apx. 5.03 Alvar Aalto, Paimo Chair
apx. 5.04 Hannah, Ashen Cabin
apx. 5.05 Wim Goes Architectuur, Refuge II
apx. 5.06 Pekka Tynkkynen & Emmi Keskisarja, Dragon Skin Pavilion



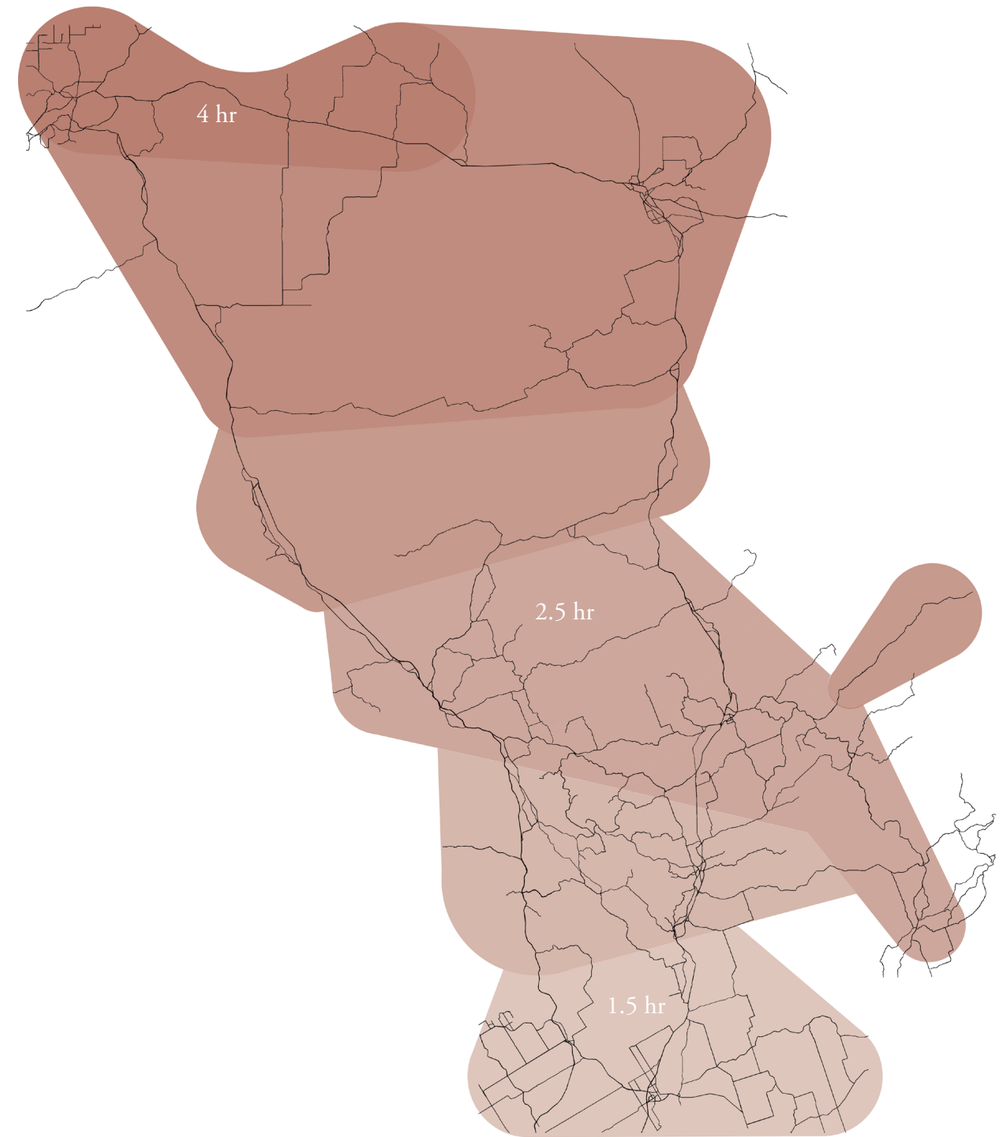


apx. 5.07 Roads + Amenities

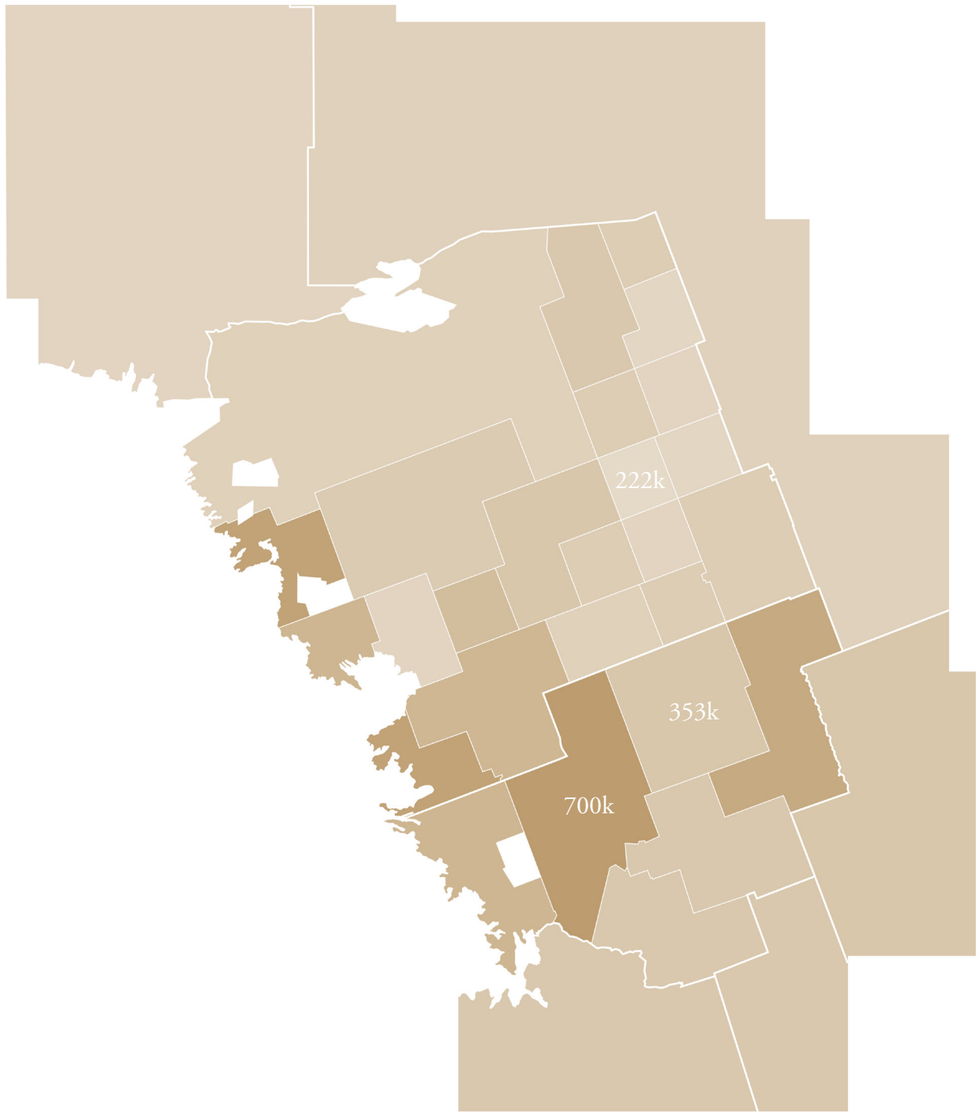


apx. 5.08 Winter Snowmobile Trails

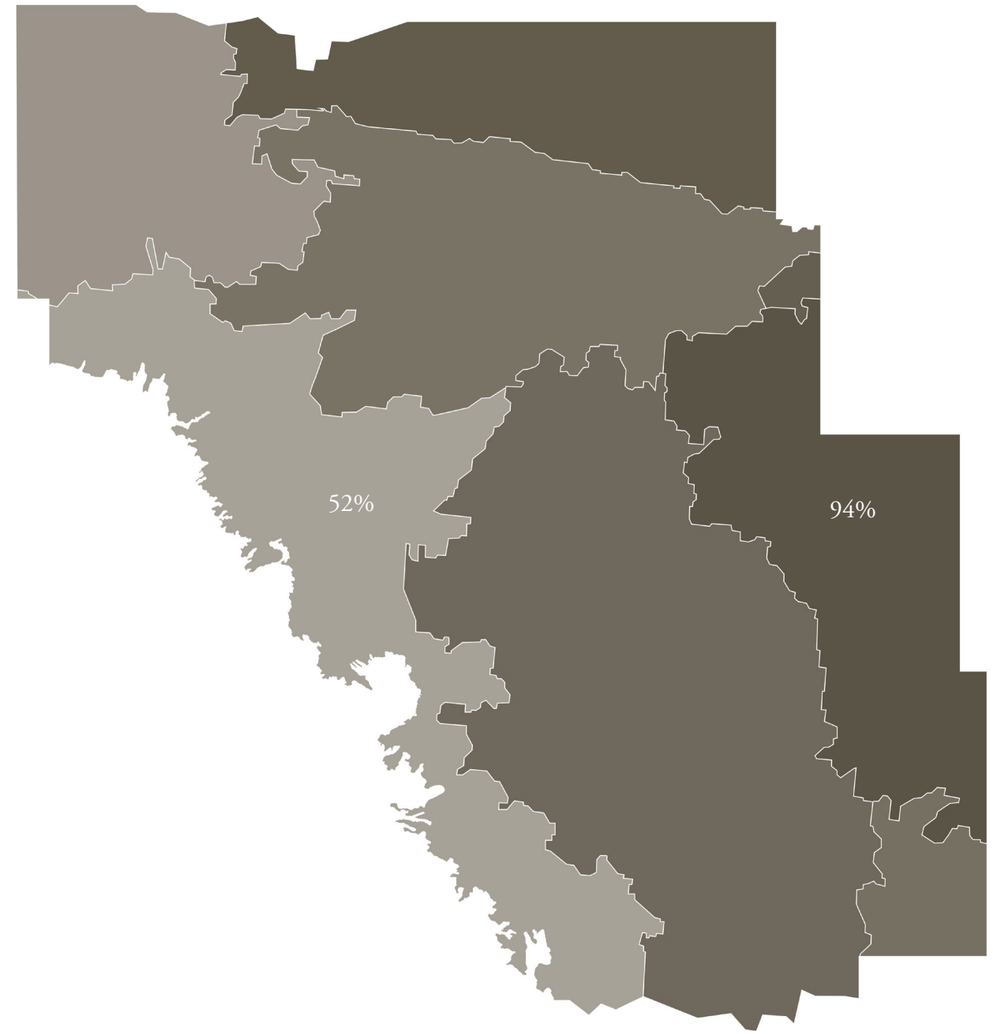
apx. 5.09 Internet Coverage



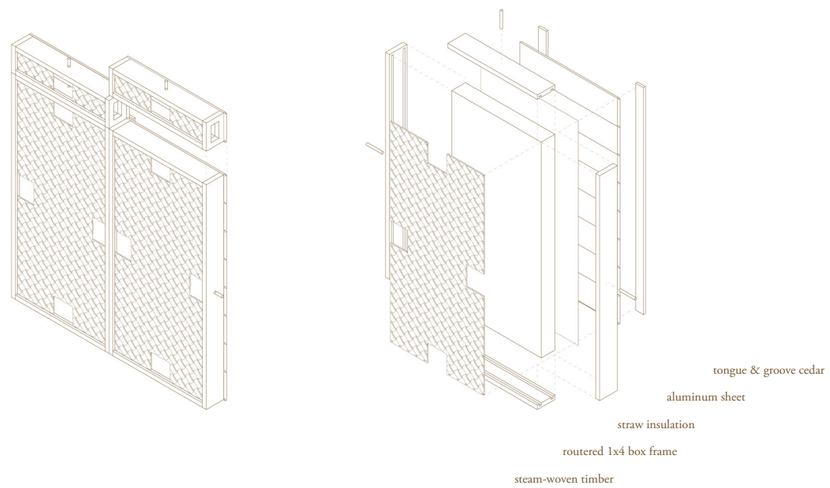
apx. 5.10 Drive Time to Toronto

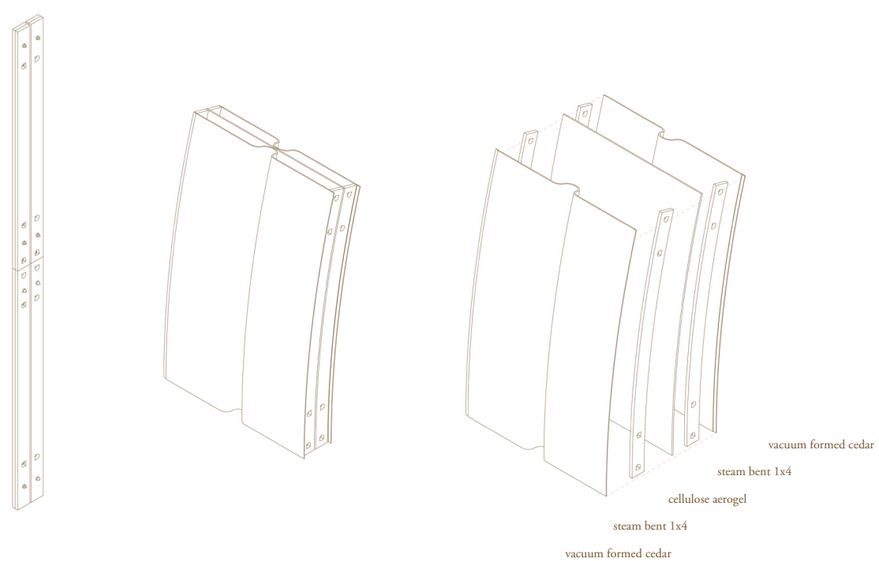


apx. 5.11 Average Property Value by Municipality

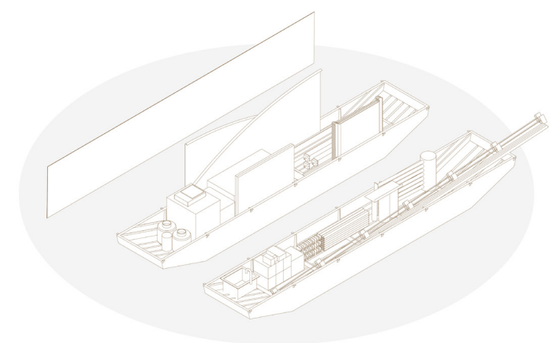


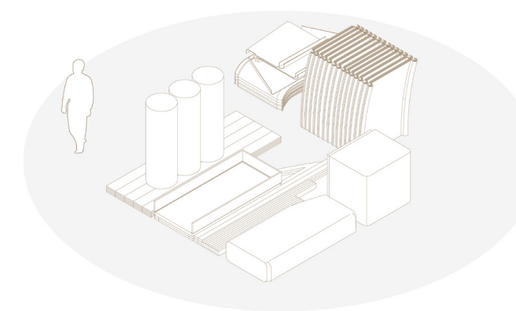
apx. 5.12 Forest Density by Ecodistrict





apx. 5.13 Wall Iterations





apx. 5.14 Project Afterlife

Item Name	Quantity	Consumption / Capacity	Weight	Type
laptop	1	150 W	1.75 kg	solar
cell phone	1	15 W	0.2 kg	solar
trolling motor	1	12 V x 20 amp	9.1 kg	solar
sink	1	40 L	13.6 kg	water
shower	1	4 L / minute	1.3 kg	water
incinerating toilet	1	12 V x 1.3 amp + 190 g	34 kg	solar + gas
water pump	1	12 V x 5 amp	2.36 kg	solar
lights	4	30 W x 4	0.08 kg	solar
monoxide detector	1	<1 W	0.2 kg	solar
propane stove	1	60 g	0.3 kg	gas
propane tank	2	+ 18 L x 2	9 kg x 2	gas
solar panel	2	+ 400 W x 2	9 kg x 2	solar
charge controller	1	2.5 W	4.5 kg	solar
solar battery	3	+ 12 V x 100 amp x 3	22.6 kg x 3	solar
inverter	1	15 W	22.6 kg	solar
pump controller	1	12 V x 5 amp	0.35 kg	solar
uv filter	1	40 W	4.5 kg	solar
water holding tank	2	+ 113 L x 2	70 kg + 225 kg (water)	water
solar water heater	1	+ 100 L	3.62 kg / 10 kg (full)	water
wood stove + coils	1	64 L	25 kg	fuel + water
		718 W consumption	**223.64 kg** (empty) **OR 528.54 kg**	

apx. 5.15 Systems Catalogue

Item Name	Quantity	Cost Per Unit	Total
trolling motor	1	$400	$400
sink	1	$294	$294
shower	1	$44	$44
incinerating toilet	1	$5,190	$5,190
water pump	1	$149	$149
lights (6)	1	$15	$15
monoxide detector	1	$35	$35
propane stove	1	$289	$289
propane tank	2	$30	$60
solar panel	2	$300	$600
charge controller	1	$93	$93
solar battery	6	$200	$1,200
solar inverter	1	$220	$220
pump controller	1	$276	$276
uv filter	1	$494	$494
water holding tank	2	$500	$1,000
solar water heater	1	$3,000	$3,000
wood stove	1	$300	$300
			$13,659
sleds + frame[1]	1	$12,000	$12,000
cedar floor planks	30	$20	$600
aerogel (sf)[2]	1,500	$10.83	$16,245
2 x 4 (12')	28	$16.80	$470
veneer sheets[3]	7,500	$1.08	$8,100
polycarbonate (sf)[4]	238	$2.63	$626
landing gear (2)	2	$400	$800
hinges	4	$300	$1,200
bolts (6")	50	$1.63	$82
nuts	50	$0.27	$14
sliding track (2)	1	$80	$80
			$40,217
			$53,876

1 - based on similar-sized custom aluminum trailer
2 - based on silica aerogel blankets as cellulose-base is not yet produced
3 - cost can be cut to nearly zero if one has access to rotary lathe
4 - based on typical polygal sheets as cellulose-base is not yet produced

apx. 5.16 Cost Analysis

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